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VIEWS, NEWS AND INTERVIEWS.

Chicago has a new music hall called Steinway Hall equipped with a large organ operated by electricity.

Col. John A. Cockerill, the representative of the New York *Herald* in Japan, recently wrote as follows:

A company composed entirely of Japanese capitalists has applied to the government for a charter for an electric railway between Tokio and Yokohama. This road is badly needed. The neatest and most profitable bit of property in Japan is the steam railway between the capital and Yokohama. The government owns it, and the profits therefrom are immense. The distance is 18 miles, and the best trains cover it in about an hour. The trains are always packed. Many foreign investors have been gazing with covetous eyes upon this section of the country, and longing for the privilege of putting in an electric passenger road between the two great cities of Japan. But if such a charter is granted it will surely be given to Japanese exclusively, and Tokio Japanese at that, for no other kind seem to be in favor at this time. The probabilities are that when this desirable road is built, if it ever is, the government will be found to be the exclusive owners.

Japan in 1893 contained 11 electric light companies, in which $2,477,250 was invested.

The horseshoers hereabout complain that their trade has been nearly ruined by the substitution of electricity for horse power on the surface cars, and also by the elevated railroads, says the New York *Sun*. Yet no intelligent horseshoer can desire that the benefits of the electric motor shall be denied to mankind for the advantage of his trade. The new motor promotes the welfare of millions of people, while the displaced horseshoers are but a small body of men. All the new labor-saving appliances are helping mankind to better times, and are also furnishing new opportunities to labor.

Professor Weber has lately given the results of a number of experiments made by him to determine the temperatures of filaments in electric incandescent lamps. He has found that the normal temperatures of all species of incandescent lamps are approximately the same, and are comprised between 1,565 degrees and 1,588 degrees C. In the case of some lamps giving a very brilliant light—that is to say, with very thick filaments—the temperature is 40 degrees higher.

The electric candle is in great request in England for the lighting and decoration of dining and other tables, says an exchange. An ingenious device for lighting the candles is provided by placing small pads under the table-cloth, and taking the current from them by means of two pin points in the base of the candlestick. The candles, of course, are extinguished on being taken from the table, and are relighted when they are replaced in the proper position. They are so arranged that the bulb and the glass imitation of a wax candle can be removed, when the candlestick can be used for an ordinary candle. When used with shades of colored silk, the electric candle makes one of the prettiest additions to a dinner table that it is possible to imagine.

Electric lights will probably soon be authorized in the churches of Rome for illuminating purposes, though wax candles and oil lamps must be retained for the use of the altars and shrines.

FIG. 1.—A BOLT OF LIGHTNING PHOTOGRAPHED AT AUSTIN, TEXAS.

To Supply Current to Colorado Mines.

The Leadville, Colo., Electric Power and Irrigation Company has filed articles of incorporation. The incorporators are Col. R. E. Goodell, John H. Pool and Edward W. Rollins, of Boston. The objects of the company, as set forth in the articles of incorporation, are to generate and supply electricity to the mines and smelters, and also to acquire land, water rights and build ditches for irrigation purposes. The company intends to utilize the vast water power now running to waste down the Arkansas River, and by the construction of an immense dam in Lake Park to store the water of Lake Park creek so that there will be an ample supply for Winter. The power house of the company will be located at Malta, and it is estimated that from 1,600 to 2,000 horse-power can be generated. The new electric company has already gotten its work well under way, has its water rights perfected and men are now on the ground attending to the preliminaries. It is estimated that the cost of the enterprise will be almost $250,000.

Massachusetts Institute of Technology.

The graduation exercises of the class of '95 were held in Huntington Hall, Rogers Building, Boylston street, Boston, on May 28, and were largely attended. There was also an exhibition of drawings and shop work of the students.

Photographs of Texas Lightning.

The illustrations on this and the following page are from photographs made by Mr. George F. Townsend at Austin, Texas, at 11 P. M., May 5, 1895. The pictures were made during the prevalence of one of the most terrific thunderstorms that ever visited the locality named. The buildings which are so distinctly outlined in both pictures are those of the State Institution for the Blind.

In both instances the electrical discharge sought and evidently found a path to the earth through an electric light tower 150 feet high and located not far distant. This tower is one of 32 similar structures recently erected for lighting the city.

In the illustration, Fig. 2, the bolt seems to be performing a curious freak in seeking a route to the earth. It seems to wind itself spirally around one of the downward bolts and then shoots off into space, still retaining its spiral form.

These photographs of lightning discharges are among the best that have been brought to the notice of the ELECTRICAL REVIEW, and Mr. Townsend, who is an enthusiastic amateur photographer, deserves to be congratulated on his success in obtaining such excellent negatives.

We've Proved Our Claim.

[*From the Western Electrician.*]

To our mind there is something confusing in the claims of our esteemed Eastern contemporaries in relation to their age. Placing these self-characterizations together, they appear to conflict. Thus:

Electrical Review: "The oldest electrical weekly in the United States."

Electrical Engineer: "The oldest electrical journal in America."

Electrical World: "The pioneer electrical journal of America."

Now, it can hardly be that these assertions are so ingeniously worded as to be all true. At least one of our venerable contemporaries is seeking to deceive its readers by a false statement. Which one is it?

ELECTRIC RAILWAY NOTES.

By June 25 every electric car in Philadelphia must be equipped with a fender.

The work of laying the rails on the street railroad at Seneca Falls, N. Y., is in progress.

The aldermen of Fond du Lac, Wis., have refused to grant a franchise for an electric railway.

There are four different companies who want to build an electric railroad —or railroads—at Belfast, Me.

It is reported that work on the Bennington and Woodstock, Vt., electric railroad will soon be begun.

The people of Hoppinton and South Framingham, Mass., will enjoy an inter-urban service of 27 cars a day.

It is stated that the new bridge for the electric railway at Turner's Falls, Mass., will be completed by July 4.

It is rumored that the New York & Northern Railroad will electrically equip its line from Harlem to Yonkers, N. Y.

The Union Railway Company, of New York city expects to lay another trolley track along the White Plains road in order to meet the increasing needs of travel.

Electric cars now run from Norristown, Pa., to Philadelphia. The fare for the round trip from Norristown to Second and Arch streets, Philadelphia, is 46 cents.

A large force of men is at work on the Tillotson electric railway lines at Oshkosh, Wis. Another force is working on the inter-urban line between Neenah and Oshkosh.

The Consolidated Traction Company, of New Jersey, contemplates running through cars from Newark to Jersey City and also from Bayonne and Greenville to Jersey City.

The New York, Westchester and Connecticut Traction Company has applied for rights of way through the streets of Port Chester, N. Y. The application will be considered on June 11.

The citizens of Ballston and Rock City Falls, N. Y., are highly pleased over the fact that the Ballston Electric Railroad Company will soon begin the work of laying a railroad track which will connect the two villages.

A contract has been signed for the Pawtucket, R. I., gas and electric lighting company to supply the Interstate electric railway lines with power, and the work of stringing the necessary feed wires has been commenced.

The Kings County Grand Jury is investigating the affairs of the Lewis & Fowler Girder Rail Company and the Lewis & Fowler Manufacturing Company, of Brooklyn, N. Y., which for some months have been in the hands of a receiver.

The City Railway Company, of New Brunswick, N. J., has awarded the contracts for building a trolley road in Middlesex County. The contracts require the work to be finished by July 1. The company is now erecting it power house at Milltown.

The duplicate 300 horse-power generator and engine at the new power station of the South Middlesex, Mass., Electric Railway Company works satisfactorily. The station is now prepared, in case of an accident to one generator or engine, to immediately start up the second.

An agreement for the consolidation of the Buffalo & Niagara Falls Electric Railway with the Buffalo & Tonawanda Electric Railway, forming the Buffalo & Niagara Falls Electric Railway, has been filed with the Secretary of State at Albany, N. Y. The routes of these two railroads form a continuous line, but neither road has yet been completed.

In criticising the trolley cars when accidents occur, it seems to be taken for granted that the blame is always with the motorman or some other representative of the corporation. But, as a matter of fact, this is no more true than when people are run over and killed or injured by the steam cars. And it is safe to say that in the majority of cases the fault is wholly that of the persons who are injured.—*Newport, R. I., News.*

The Union Railway Company, of New York city, is preparing to extend its trolley lines through the Southern Boulevard from Lincoln avenue to West Farms, but is delayed, it is said, by the Board of Electrical Control, in the matter of obtaining permits. The company is doing the surface work, and says that the road will be in working order in a short time if the permits can be obtained without delay.

The directors of the Gloversville and Broadalbin Railroad Company met in Gloversville, N. Y., recently, and permanently organized by the election of the following: President, John H. Richardson, of Gloversville; vice-president, Dr. H. C. Finch, of Broadalbin; secretary and treasurer, Frank Burton, of Gloversville; superintendent and engineer, J. Wallace Cleveland, of Broadalbin. Maps and profiles of the route were adopted.

The question as to what part of a street car is its front end is in dispute between the people of San Francisco and some of the street railway managers. An ordinance says that fenders shall be attached to the fronts of the cars. The people hold that the front of a car is its forward end. Some of the trolley men insist that the law will be obeyed if they attach fenders to the ends of the trucks, about five feet back from the forward dashboards, underneath the platforms.

It is reported that H. M. Littell will succeed Benjamin Norton as president of the Atlantic Avenue Railroad Company of Brooklyn, N. Y. Mr. Norton's resignation goes into effect on July 1. Mr. Littell has been the general manager of the New Orleans Traction Company, and it was under his direct supervision that 120 miles of trolley lines have been established. The system will be in operation when Mr. Littell gets to Brooklyn. Mr. Littell is also the president of the New Orleans & Lake Railroad Company. It is said that he will receive a salary of $15,000 a year as president of the Atlantic Avenue company.

FIG. 2.—ANOTHER LIGHTNING DISCHARGE PHOTOGRAPHED AT AUSTIN, TEXAS.
(See page 297.)

Rapid Transit for New York City Progressing.

The Rapid Transit Railroad Commission, of New York city, held its annual meeting on May 28. This was the first meeting of the Commission since May 9. Those present were John H. Starin, Seth Low, John Claflin, William Steinway and John H. Inman. Alexander E. Orr was re-elected president; John H. Starin, vice-president and John Claflin, treasurer.

A communication was received from several prominent men asking the Commission to establish terms upon which a system of pneumatic tubes for the transmission of parcels and mails might be constructed and maintained in the rapid transit railway tunnels. Chief Engineer Parsons was asked to make a report on the matter. Another letter was received from a firm of contractors asking for definite information about the plans of the proposed road on which to base an estimate of the cost of construction of the road.

The chief engineer was instructed to confer with the Commissioner of Public Works and with the officers of the various companies which have wires and pipes under ground, and to report regarding the provision which must be made for them along the rapid transit routes. The chief engineer was also asked to report his conclusions as to what were the most desirable locations for stations, and also what he would recommend as to a method of operation and the necessary equipment of the road.

The bill adding $5,000,000 to the $50,000,000 already appropriated has become a law, the Board of Aldermen has approved the routes and general plans of the Commission, and considerable progress has been made toward getting the consents of property owners along the proposed lines. The Commissioners hope that by the middle of June enough consents will have been obtained to enable them to go ahead with the road.

Questions on Railway Motor Commutators.

TO THE EDITOR OF ELECTRICAL REVIEW:

Can you, through the columns of the ELECTRICAL REVIEW, get me any information on the following?

In a very prominent type of street railway motor I have noticed that in about two-thirds of the commutators, a burning or arcing takes place at the outer end of the segments.

This arcing occurs between two adjoining bars at perhaps half a dozen different places around the commutator.

It keeps burning in this way (at intervals, I think) until it chars the mica ring at the end of the bars and finally causes it to ground. Now this I am positive is not caused from dirt, a broken wire or a loose connection.

The only idea I have about it is this: That when the armature runs at such a speed that it is going much faster than the current will cause it to revolve, that there is a reaction of some kind taking place in the motor which causes this burn.

I have seen motormen run down hill at an enormous speed and at the same time have the current turned on, and in a short time the car would come in with a grounded commutator from the cause mentioned above.

As I have never heard any one speak of this, I would like to have some good opinions on the matter.

Yours respectfully,

CLYDE LANDERS.

Tacoma, Wash., May 23.

A High Compliment.

TO THE EDITOR OF ELECTRICAL REVIEW:

I am as glad as glad can be to see so many evidences of the prosperity of the ELECTRICAL REVIEW. The course of the paper on all important points has been such as to win for it the commendation and support of every person at all interested in electrical matters. Even the advertisements are presented in so attractive a manner as to claim more attention than reading matter does in some other journals. Long may you wave!

Yours truly,

FRANK B. KNIGHT.

Austin, Tex., May 16.

Telephones and Thunderstorms.

[*From The London Lancet.*]

Do overhead telephone wires exercise a controlling influence on the electricity of the atmosphere? That the converse occurs is evidenced only too plainly by the disturbances in telephonic communication which result from the presence of proximity of a

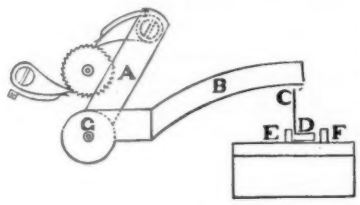


FIG. 2.—DETAIL OF MECHANISM OF THE EDMONDSON METER.

thunderstorm. More than one instance may be recalled of a telephone wire being struck by lightning to the detriments of the instrument and to the discomfiture of the listener. Such a case was commented upon in *The Lancet* of May 5, 1894. But do overhead wires ward off lightning? We are indebted to the *Decorators' Gazette and Plumber and Gasfitters' Review* for the "fact" that the risk to buildings of being struck by lightning in places unprotected by overhead telephone wires is nearly five times greater than in places provided with a telephone system. An immunity of this kind cannot be considered improbable. It is to be remembered that an overhead telephone wire becomes in point of fact a lightning conductor, and in this capacity may act in two ways: 1. By equalizing differences of potential it may prevent the occurrence of the disruptive discharge. 2. Receiving a lightning charge it may carry the current to earth. With reference to the first point there can be little doubt that overhead conductors if connected to earth do play an important part in the distribution of atmospheric electricity. Lord Kelvin in a recent paper (read before the Philosophical Society of Glasgow) states that the difference of potential he obtained between the earth and an insulated burning match placed nine feet above the ground was 200 to 4,000 volts. What, then, is the result of permanently connecting by a good conductor the earth and the atmosphere directly above it, a condition which exists in the case of single-wire telephone circuits? Such an arrangement must tend to equalize potential and prevent the accumulation of those charged masses which no doubt form the nucleus of the storm cloud. This equalization will continue to take place in all conditions of weather. But when a storm does occur it is obvious that if struck by lightning the wire carries the current to the point of greatest danger—viz., to the instrument and to any one in its vicinity. Therefore, unless the strictest structural precautions be taken such a wire becomes a source of danger rather than of safety. To obviate this danger every post or support for overhead wires ought to be fitted with a lightning guard, and every instrument, whether using the earth as a return or not, should be fitted with an efficient form of lightning arrester. Where the overhead wires are not connected to earth, as is the case with overhead "lighting mains" and "twin" telephone circuits, any equalizing effect upon potential difference is practically lost, and any circuit connected with overhead wires of this kind must be dangerous, inasmuch as such wires become lightning conductors in all but the saving device of an earth connection. For "lighting mains" it can scarcely be doubted that the underground system is in most respects the better: 1. For obvious reasons connected with the size of the cables. 2. For the electrical reason that if carried overhead no earth connection is allowable by the rules of the Board of Trade. For telephones the adoption of the "twin wire" system seems to bring with it the advisability of placing the wires below the surface of the ground, inasmuch as this system does away with the earth return as part of the circuit. It therefore appears that from an electrical point of view there may be in overhead wires an element both of safety and of danger. The latter will certainly predominate unless supports be protected with lightning guards and every instrument provided with an efficient "protector"—that is, with an unfailing means of carrying a strong current to earth without passing through the instrument. Is this secured in practice? Can it be secured with any certainty by even the best lightning arrester or earthing device of any description? So long as the coarse expedient of a connecting wire is necessary for the guidance of electrical energy, so long must this question of "wiring," with its safeties and its dangers, be one of great and growing interest. But it may be pointed out that if every house were fitted with an efficient form of lightning guard a greater immunity from lightning discharges would be secured than that which at present exists with the closest network of overhead telephone wires.

The Edmondson "Zero-Torque" Meter.

At the last meeting of the Institution of Electrical Engineers Mr. Joseph Edmondson, of Bradford, England, exhibited and explained an ingenious electricity meter of the dynamometer type, the illustrations of which, presented herewith, are from the London *Electrician*.

The meter, a general view of which is given in Fig. 1, is nothing more than the well-known Siemens dynamometer, combined with mechanism for measuring and integrating at short intervals the torque excited on the moving coil by the current going to the lamps. The motion of the moving coil is limited to an arc of less than one degree, and the use of a durable steel wire suspension, instead of the delicate suspension of the ordinary dynamometer, is thus rendered possible. A torque of about 90 degrees is given to the usual spiral spring every two minutes by a reciprocating quadrant, or "mangle-wheel," driven by a vibrating motor, consisting of a magnet and its armature, the motor being controlled by a small gravity-driven pendulum, starting automatically and having a sparkless contact, due to the use of a condenser and a resistance, as in the Oulton-Edmondson clock meter of 1893. The action of the instrument is made plain by Figs. 2 and 3, in which A is an arm pivoted at G, carrying a click working into a ratchet-wheel, and driving the registering train. It receives a reciprocating motion from the vibrating motor. Fixed on its arbor is the arm B carrying the steel pin C. The flat steel stop D, which is on an arm projecting from the moving coil of the dynamometer, is free to move between the stops E and F. When the current is nil the stop D remains against the stop E, as in Fig. 2. In this position the pin C comes down upon it at each vibration, and the arm A is thus prevented from vibrating far enough to take a tooth at the ratchet-wheel. The registering is therefore nil. But when the moving coil of the dynamometer is deflected by the current the stop D moves to the right, and it assumes the position shown in Fig. 3. The pin C can now descend into the space between the stops D and E, and the arm A can vibrate to its full extent, and the registering proceeds. This continues until the reciprocating quadrant, or "mangle-wheel," in its motion to the left, acting through the spiral spring, exerts on the moving coil of the dynamometer a torque equal to that exerted by the current, brings the stop D back to the position shown in Fig. 2, and stops the registering. This action is repeated with each reciprocation of the "mangle-wheel." As the period during which the registering proceeds in exactly proportional to the torque exerted by the current on the moving coil of the dynamometer, the diagram of registration is a straight line. A 25-ampere meter will register from one-tenth ampere upwards. The total current required for the shunt circuit and the vibrating motor never exceeds, and is generally less than, two-hundredths of an ampere. The moving coil of the dynamometer, being in the center of a cylindrical iron case, is shielded from external magnetic influence. The meter is calibrated to read direct in kilowatt-hours with a constant of 1.

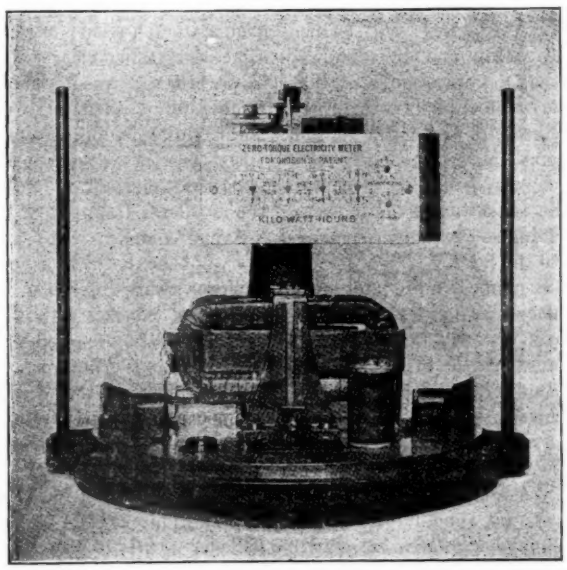


FIG. 1.—GENERAL VIEW OF THE EDMONDSON METER WITH CASE REMOVED.

Electrical News from Chicago.

The Central Electric Company, of Chicago, says that although the frost seems to have caught the young grapevines and Pingree potatoes, and the Hessian flies have chased wheat almost out of the pit, up to the present there are no flies on the Lundell fan motor, Hessian or otherwise, and while the atmosphere in the neighborhood of a Lundell is always more or less frosty, it does not reach an uncomfortable degree. Inquiries come pouring in just the same, and prospects for a brilliant fan-motor season are very promising.

They also report a steadily increasing demand for interior conduit and kindred supplies. Architects and owners are rapidly learning the value and expediency of the perfect work

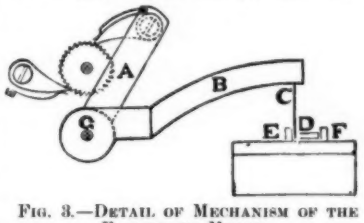


FIG. 3.—DETAIL OF MECHANISM OF THE EDMONDSON METER.

made possible with interior conduit. A recent large order covered several thousand feet for an Illinois post office.

The Citizens' Telephone and Telegraph Company has been organized in Mississippi with John P. Mayo, of Columbus, as president. The company already has an exchange of 75 subscribers in working order at Canton and is building another in Aberdeen. Still another exchange will soon be built in Columbus. E. L. Young, of Columbus, is superintendent in charge of this work.

SOME PHYSIOLOGICAL EFFECTS EXPERIENCED IN CONTACT WITH LIVE ALTERNATING CURRENT CIRCUITS.

BY LUDWIG GUTMANN, M. A. I. E. E., IN "ELECTRIC POWER."

Since one of the topics of the day is the effect of the electric current, and especially alternating current, on the human body, it may be of interest to throw some further light on this question, and on those unfortunate beings who find themselves unintentionally or otherwise in the grasp of this mystic power. So far, no one who survived has satisfactorily explained his feelings, and it might be supposed erroneously that everybody would be unconscious as soon as he had established connections with a live circuit.

Having had a number of men under me doing work on such circuits, I have tried to find out from those who have experienced severe shocks what they had felt, but received replies from which no logical conclusions could be derived, with one exception, namely, regarding the length of time they believed they were in the circuit. I have found invariably that men caught on alternating current circuits would estimate the length of time of contact a great deal longer than could be accounted for, and their statements have been contradicted and disproved by others near at hand at the time of the accident. A man who had formed part of a circuit would say he believed he was in circuit for 10 minutes, when the whole time may not have been more than as many seconds, or at the outside half a minute, as learned from the statement of others.

While trying to unravel this mystery, which I began to think was not intended to be known to man, the means of acquiring the information were accidently placed in my way. It happened this way:

My experimental room was located on the first floor of the factory and divided from the main part in which light machine work was done by a low partition. There were some 40 or 50 men engaged on this floor, filing, hammering, fitting, turning, etc.

The dynamo utilized for testing was on the ground floor, and the switch controlling this, a special circuit, temporarily arranged and brought to my room, was between my room and the transformer test-room. Having finished some determinations regarding a new type of transformer, I went out and opened the switch and returned to my room. Then I carelessly opened the connectors, not expecting that on my return to the room somebody else would close the switch again, which proved to be the case in this instance. On getting hold of the primary wire of the transformer with one hand and the circuit wire with the other and pulling them out apart from the connectors, I placed myself directly in the high tension circuit. I was caught, the bare ends of the wire were held one in either hand, which, by the flow of current were closed, holding the wire, a No. 8 or 10 Brown & Sharpe, tightly in the hands.

For an instant I was stunned; when this momentary unconsciousness passed away I found myself unable to breath, utter a cry for assistance, or move. I was spellbound in a crouching position. The noise around me in the shop seemed to be very weak—it was as if I was a block or more away—and the hammer blows, which generally made the shop so noisy, were very faint. I was not capable of thinking about myself, and the danger in which I was placed. All I do remember besides the faint hammering was that I felt my arms shake as if in the grasp of some powerful man, in a playfully exaggerated hand-shake.

I felt the rolling action of the current impulses as they slowly approached, just as we observe the heavy waves approaching the shore on the beach.

Suddenly the wires had burned through the skin and in some way did not make proper contact. The current was momentarily interrupted and I jumped up, or as this motion was a passive one on my part, I was straightened out from my bent position by the relaxation of the muscles, while in doing so the dangerous wires dropped to the floor.

I was free once more and after taking a deep breath I felt a glowing heat all over my body and a weakness in the limbs, just as after a fainting spell. In spite of this trouble, which had not been noticed by anybody, I continued to work feeling ashamed of having been caught in that way. The dynamo was a 10-pole alternator, yielding at the time 1,100 to 1,150 volts while my body was in series with the primary coil across the terminals of the generator.

With this unexpected experience at my disposal I have been able to explain a number of sensations. Of course I must admit that the current was weak enough and the conditions favorable enough (for me) to recollect but I believe that it was very near the limit. I could neither breathe, utter a sound, move, nor was I capable of thinking of anything except the sensation to which I was subjected, as no other thoughts, not even fear for my life or knowledge of my predicament, entered my mind at any time. All such ideas must have been dormant. This experience occupied my mind in my leisure moments and I asked myself: Could you not have counted the alternations had you thought of it, especially as every impulse seemed so clear and distinct, such a slow rolling motion, starting in the hands and creeping up the arms with such a long time apparently between the waves?

At first I thought I could have done it, but later I came to the conclusion that to experience and feel every impulse distinctly is one thing, and to remember, record or intergrate is an entirely different thing, leaving out of consideration the fact that the concentration or retention of such a thought of counting or attempting to count would be a questionable, if not an impossible, task, under the influence of the current.

We can understand why some people think the sensation is like that of being beaten, or why I felt the severe hand and arm shaking. It is simply the result of the current on the muscles which alternately assume a state of contraction and relaxation. The strange fact that men believed to have been in circuit a considerably longer time than was actually the case can now also be accounted for; evidently, if you can clearly distinguish every impulse, the brain must be capable of counting 16,000 in a minute, even if we are not able to mechanically record it. Under these conditions a quarter of a minute would mean counting mentally to 4,000 and any man would naturally think the time must be more than five minutes.

The very fact that men have made such statements with the error in the same direction, clearly shows that they were not unconscious but that some *part* of their brain was temporarily disabled or paralyzed.

Dr. Goelet's conclusions, derived from the examination of the body of the murderer Hampton at Sing Sing, are very logical.* They should, however, not be used in a general way. There is a vast difference between an accidental contact with a live wire, and especially prepared connections for executing criminals. His conclusion, however, that death is painless because "electricity travels faster than the nerves can transmit painful impulses," seems to me erroneous, believing that three times the number of alterations as used at present can still be clearly distinguished by the brain.

Death may be instantaneous, if a large amount of energy is suddenly discharged through the body; it can be painless also when the apparatus is less powerful and properly applied, because a sufficient amount of energy used, while it may not cause instant death, will produce contraction or expansion of parts of the brain either by direct action of the current or more probably by the pressure of the blood vessels on the surrounding portions of the brain, causing instantaneous unconsciousness, while death results ultimately from the decomposition of the blood, or, as these investigations have also disclosed, by the bursting of blood vessels in the brain with their well-known effects.

The statements made by Professor D'Arsonval have proved to be incorrect as regards the executions in New York State, yet the controversy he has caused has been of incalculable value, for it has been the cause first of establishing the truth, and, secondly, to restore to life those or many of those who accidentally have fallen into the grasp of this invisible force. It is gratifying to know that, owing to just these controversies and the resultant instructions given, a number of hapless victims have been restored to life by artificial respiration.

* "Dynamic Apoplexy," ELECTRICAL REVIEW, April 24, 1895, page 213.

A New Thermo-Battery.

A further attempt to make a thermo-chemical galvanic cell has been described in the *Comptes Rendus* by M. Desire Korda, who worked with ordinary gas retort carbon. M. Korda finds that. if barium peroxide is heated to redness in contact with a carbon plate, the oxide becomes reduced to baryta, with the attendant phenomenon of a difference of electrical potential of about one volt, the carbon plate being negative. A similar result was obtained with cupric oxide, when a layer of potassium carbonate was placed between the oxide and the carbon, the difference of potential in this case amounting to 1.1 volts. In these experiments, the plate of retort carbon was connected by means of a platinum wire to one terminal of a Richard voltmeter, and a few cubic centimetres of the salt operated upon were placed on the carbon. A platinum wire dipping in the salt served to complete the circuit. The carbon was heated to a dull red in an atmospheric gas flame, when a violent effervescence took place, carbonic acid being given off, and the voltmeter showing a deflection. This deflection of the needle remains constant as long as any of the higher oxide is left upon the carbon. The experiment is, at any rate, a simple one.

Telephone Wanted.

TO THE EDITOR OF ELECTRICAL REVIEW:

We have come to enjoy the weekly visits of the REVIEW very much. It is certainly an up-to-date paper.

We wish to profit from your knowledge and experience and therefore take the liberty of asking your opinion as to the best make of telephone for use on a private line about a mile in length. We want a telephone that will talk *loud* and *clear* and that will not require frequent and experienced adjustment. Will you oblige us by the above information, giving name of manufacturer or dealer, and price of instrument, if possible. Thanking you in advance for your courtesy in the matter, we are,

Respectfully yours,
WILL O. GREEN.

Fairport, N. Y., May 24, 1895.

Cotton States and International Exposition.

Designs for the Grand Fountain in the middle of the Central Plaza at the Cotton States and International Exposition, Atlanta, Ga., are about completed. It is proposed to have a Grand Basin, from the center of which a great jet of water, 100 feet high, will be thrown. Into this, from all sides, will be poured streams of water of smaller size. This fountain will be particularly beautiful at night, when illumined by electric lights, and by the great search-light from the dome of the Government Building, which will play on it from time to time. It will be second in beauty only to the magnificent electric fountain which will shoot over 100 feet in the air from the center of the Grand Basin, in front of the Machinery Hall.

The Brownley Injector.

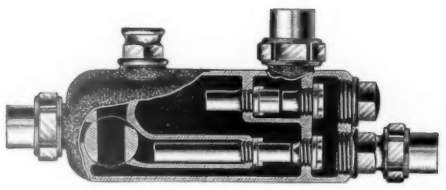
The accompanying illustrations show the new Brownley double tube valveless injector, which works at any pressure from 15 pounds up to 350 pounds, works all the way from 350 pounds down to six pounds without any regulation and without breaking, and lifts and feeds water on a three-foot lift at temperatures up to 156 degrees, and on a two-foot lift as high as 130 degrees.

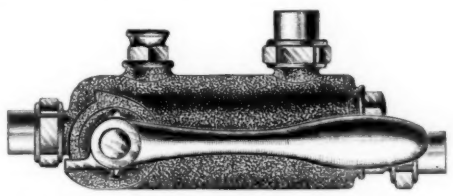
The device appears to be very simple. The steam inlet is one size smaller than the suction and delivery —thus being very economical as regards steam. To start the injector, steam is given, when the water will immediately appear at the overflow; the cock is turned by means of a lever, and the water is then being fed to the boiler. No variation of steam at any point from 350 pounds down to six pounds of steam causes any loss of water at the overflow.

There are no valves to grind. An ordinary mechanic can take machine apart and put it together in five minutes.

It is claimed that the Brownley is the only injector which has yet been made to feed up to 350 pounds pressure. It feeds just as easily at that point as at any other.

Circulars containing certificates from reliable and well-known users of steam can be obtained on application to Mr. E. F. Keating, 449 Water street, New York, the general agent in the East.





FIGS. 1 AND 2.—INTERIOR AND EXTERIOR VIEWS OF THE BROWNLEY INJECTOR.

What Is the Limit of the Passenger Capacity of a Suburban Track?

Mr. Fr. von Emperger sends the following communication to the *Railroad Gazette:*

The daily papers have printed a statement from the Rapid Transit Commission that the capacity of the proposed two rapid transit tracks below Fourteenth street will be 90,000 passengers an hour. This is based on 60 trains for local service and 30 trains for express service an hour, each train being composed of 10 cars carrying 100 passengers each.

This figure, if correct, would prove that the Manhattan Elevated road must be going at a snail's pace, because, with its four tracks below Fourteenth street, it is not able to comfortably carry 30,000 passengers an hour, which is about the average, while 30,000 passengers an hour on one track is the highest record. This comparison alone should prove that there is something wrong in the above figure or merely a *captatio benevolentia*, because it is a well-known fact that the Manhattan company does the best it can, even better than any other urban railroad in the world in regard to trainmen, stops, etc., as a reference to the report of Mr. William Barclay Parsons will show, and it can be regarded as carrying the highest number of passengers in local traffic that it is possible to carry. It is not that it could do better that we need a tunnel road, but because the elevated road cannot do all the business, anyhow.

In view of the peculiar difference it will perhaps be of interest to see what the real capacity of the two tracks, one local and one express, is: The Rapid Transit Commission give as the capacity of their proposed car, 100 passengers, against 48 seats in the present "L" road cars. The Manhattan company states that there is further standing room for 32 passengers more, or 80 passengers in all, and every New Yorker knows that the "L" road is not exactly modest in its claim of standing capacity, especially because they take as the above highest record, shown considerably more than that if necessary.

Speaking of the average capacity, I cannot imagine that anybody would think of anything else than of the seating capacity as an average, leaving the case of people standing for exceptional cases and not when they go daily downtown to their offices and return from them.

Such a car of the "L" road is 45 feet long, and if we take the rapid transit car as being only 60 feet long, we can see that about 30 passengers of the estimated 100 would have to stand.

A train of 10 cars and the motor will be 700 feet long. The stations would have to be, at least, of the same length, and so it would be almost more advantageous to construct the tunnel all through of the whole width of the stations. Most stations would be only three train lengths apart. The "L" road stations are not over two hundred feet long. There would further be necessary a rolling stock of, at least, 2,000 cars, if we assume that besides the 90 trains starting in one direction during the rush hours there must be trains on the other parts of the tracks besides (the elevated road has only 1,000 cars). A moving sidewalk would in such a case be the better proposition, although they only claimed 33,000 passengers an hour in Chicago. Taking into consideration that such long trains would be uneconomical to handle, and would require special brakes and machinery for traction, and could not get up any speed within the short distance between stations, we must conclude that it is impractical, if not impossible, to go over five cars and a train of 300 feet in length as now used. A car over 40 feet in length, with standing room and end doors should not be permitted to be used, as people seated in the center of a crowded car will find it impossible to get out in time, and the arrangement of additional doors in the center has even been earnestly advocated with the short cars, but of course would need either a double train crew or stops twice as long.

The capacity of such a train is 240 passengers seated, or including those standing it is 400 in all. Taking 50 trains an hour for the local and 20 for the express track we have a train every one and one-quarter minutes on the local track and one every three minutes on the express track. This is all that would be safe, and I would rather say it is over the safe limit, because three-minute distance is dangerous for a train expected to run at the rate of 40 miles an hour, and I would not recommend it if it were not for the fact that above Fourteenth street the distance is double.

Below is a table of the number of trains during the rush hours on the elevated road as an example of what can be done. It is compiled from the time tables of the Sixth and Ninth avenue lines, northbound, between 5 and 7 P. M.:

	9th Ave. Local.	6th Ave. Express.	6th Ave. 58th St.	6th Ave. Harlem.	59th St.	155th St.
5 o'clock.....	4	1	2	10	8	8
5.15 "	5	3	3	9	11	8
5.30 "	3	2	2	11	14	11
5.45 "	5	1	3	9	14	14
6.00 "	5	0	2	10	13	14
6.15 "	5	0	3	7	13	12
6.30 "	4	0	2	8	11	13
6.45 "	3	0	3	7	9	11
7.00 "						

In the hour between 5.15 and 6.15 o'clock there run on Ninth avenue 24 trains, of which six are express trains, and on Sixth avenue 49 trains, of which 10 go to 58th street, the remaining 39 trains going over to 59th street and Ninth avenue, and there join the previously mentioned 24 Ninth avenue trains, making at this junction 63 trains an hour, of which 10 remain and return and only 53 trains continue on the two tracks northward, six of them being express trains, leaves 47 trains on the local track. We see that the Sixth avenue line has the highest record with 49 trains, starting simultaneously from South Ferry, Rector and Franklin streets. The record of 59th street station, 63 trains, is of no avail, as it could not be maintained on a current track and is applicable to this station only.

In spending an evening hour at 59th street or Chatham Square stations (the highest record at the latter station is 56 trains, with 45 for Third avenue) any person can very easily see that there is no possibility of increasing the number of trains. Trains follow so quickly that if they were as long as the Rapid Transit Commission suggest a tail-end collision would be of daily occurrence. It should be especially noted that the high record on the Sixth avenue line can only be attained by starting three trains at one time at different stations, because it shows that the requirements of traffic and working are entirely disregarded in the "adopted plans" which show one pair of tracks below City Hall.

From the figures given we get the following capacity:

	Number of trains.	Seating capacity.	Highest permissable capacity.
Local trains.....	50	12,000	20,000
Express trains....	20	4,800	8,000

There is no question that the capacity actually used by the Third avenue line of 30,000 an hour could be attained, but it is also out of the question that such a mode of travel should be considered. The highest permissible capacity of the whole Rapid Transit road below Fourteenth street, consisting of two tracks, would then be 28,000 passengers, of whom 10,000 would have no seats, and the necessity of construction of four tracks down to City Hall, and two below it, seems to be evident, if the service of this road shall be anything like what it is expected to be.

In European cities, where cars with side doors are used, the seating capacity of the cars is increased, because the aisle in the centre can be used for seats. The trains which there, as well as here, have not more than five cars can accommodate more passengers (400 to 500 against 240 to 400), but as the closing of the doors take more time than cars with end gates only, the stops are longer, and trains cannot be in the least less than two minutes apart, so that the hourly capacity is the same in the end. A superficial investigation I have made does not show any route having a greater capacity than 15,000 passengers an hour and no greater maximum capacity than 30,000 passengers an hour is given. As the Rapid Transit Commission claim that 60,000 passengers an hour could be handled by one track this claim should not go unchallenged.

ELECTRIC LIGHT FLASHES.

The Merchants' Bank Building at New Bedford, Mass., will have a 500-light incandescent plant driven by rope transmission.

The citizens of Johnstown, Pa., where the street lighting costs $20,000 a year, want the price per lamp reduced from $100 to $50 a year.

The city of Bellefontaine, Ohio, has advertised for bids for an electric light plant, to be run by the city. Bids to be opened June 25 next.

City Clerk Hackney, of Springfield, Mo., is trying to obtain information as to the cost of electric street lighting by sending question blanks to other cities.

The Citizens' Municipal Association has prepared an elaborate statement of the prices of electric lighting in a number of large cities of the Union, with the purpose of showing that Philadelphia suffers from systematic extortion by the so-called "electric combine."

The Nazareth, Pa., Electric Light and Power Company is negotiating with the Edison Illuminating Company, of Easton, to have the latter furnish the current for 500 incandescent lights for commercial use at Nazareth. In case the arrangements are consummated, the Nazareth company will build a seven-mile line of copper wire leading from that place to Easton.

The application of the Montclair, N. J., Light and Power Company for a town contract has been rejected on an adverse report of the Street Lighting Committee. The grounds of the decision were that the proposed arrangement does not protect the town adequately, and that arc lights as proposed for the streets are not desired by the people. The matter was generally referred to the committee to consult with the company regarding a new proposition.

At a recent meeting at Columbus of representatives of electric light and power companies of Ohio an organization was formed. About 50 companies will become members of the organization. The officers elected are: President, A. W. Field, Columbus; vice-president, W. C. Hedges, Mansfield; secretary-treasurer, Samuel Scovil, Cleveland. Executive board, George S. Long, Troy; L. C. Newsom, Columbus; P. P. Holmes, Youngstown; H. K. Wood, Piqua.

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, JUNE 5, 1895.

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The electric fan is welcome nowadays.

Electricity will soon capture the elevated road of this city. Then Brooklyn. Every citizen of both these slow villages will rejoice when that good time arrives.

What has become of the incandescent lamp tests made at the World's Fair? If it is the intention to give out these tests for publication, it is time it was done, provided the tests are finished. If they are not finished, why not? Is it possible the lamps submitted for test two years ago are burning yet?

We have it on good authority that the impression among the responsible men of both General Electric and Westinghouse is that patent litigation has become a needless expenditure. While nothing conclusive has been done, several conferences have been held and a patent arrangement, and nothing further, is now very probable.

If the several manufacturers of telephone apparatus, outside the Bell fold, will unite in a national organization the effect will undoubtedly be highly advantageous to their interests. The organization already formed at Chicago, if run on the broad-gauged principle that we believe it will be, should soon include every such manufacturer in its list of members.

TWO WARM WEATHER FACTS RECORDED HERE.

The ELECTRICAL REVIEW has the distinction of possessing more readers who pay for it than any other electrical journal in America. And its "high water" issue—number of copies issued one week—is greater by several thousand than any edition of its contemporaries. These are warm weather facts.

ELECTRICAL EXHIBITION IN NEW YORK.

What has become of that subcommittee which was formed to discuss the question of holding an electrical exhibition at the Grand Central Palace in New York, next year, when the N. E. L. A. meets?

In order to accomplish proper results no time should be lost in getting down to work. We understand that the management of the Grand Central Palace is prepared to offer a very favorable proposition on the subject if it can be presented now. That sub-committee has a considerable task before it and there is no time to waste. Gentlemen, can't you get together?

ELECTRICITY ON THE ELEVATED TRAINS.

Under the above heading the New York *Herald* endorses this movement in favor of electricity in the following pertinent sentences:

Among the boons promised by several of the schemes for rapid transit that have been laid before the public, the use of electricity to propel and light the trains was one that appealed strongly to the public. While real rapid transit appears to tarry afar off, there is a possibility that the electric motor may be set at work upon the existing elevated roads. It is a consummation devoutly to be wished.

The underground trolley system is already in operation in this city, and if satisfactory results can be obtained in that way the elevated structures surely offer a much better field for the same kind of motor power.

As the cost of the change from steam to electricity would, of course, be great, it is not to be expected that the Manhattan company will make it unless the running expenses will be thereby largely diminished. But as the comfort of passengers and of people who live along the route would be greatly augmented by the substitution of electricity for steam on the elevated trains, the uptown residents of the city will be unanimous in offering heartfelt prayers that electric motors may be cheapened.

We believe that electricity would have been adopted as the motive power on the elevated roads of this city several years ago had Cyrus W. Field not lost his control of that property. Through the efforts of his nephew, Mr. Stephen D. Field, one of our ablest electricians, a train was run by electricity with excellent results on the Thirty-fourth street branch of the road. Soon after the losses of his uncle compelled a cessation of the work, and nothing has been done in this line since.

MR. SIMON STERNE NOW PAYS FOR HIS TELEPHONE.

Lawyer Simon Sterne, of New York city, who commenced suit against the Metropolitan Telephone and Telegraph Company some time since to secure lower rates for telephone service, has withdrawn the suit, paying all costs to date, and signed contracts for telephone service at the regular rates established by the company.

Simple Simon met a pieman
Going to the fair.
Says Simple Simon to the pieman,
"Let me taste your ware."

Says the pieman to Simple Simon,
"Show me first your penny."
Says Simple Simon to the pieman,
"Indeed, I haven't any."

It will be seen from the first above that our friend Simon discovered his penny, and becoming satisfied that he could not secure the telephone pie in any other way, promptly paid it over.

Wall Street and the Electrical Stock Market.

The market of the week was dull, hesitating and conditioned largely upon the development of the crops. Reports were very conflicting and caused stocks to move within a narrow range. The industrials, however, were much stronger, owing to the sustained and, in many cases, continued improvement in the various lines of trade. The last industry to take its place in the van of the improvement is iron and steel. Inasmuch as this is a basis of a majority of the others the effect is decidedly bullish.

There was some little activity in industrial stocks and particularly in General Electric. The stock deal in this property has evidently been consummated in as far as leading interests have been afforded an opportunity to increase their holdings and negotiations for an alliance between Westinghouse and General Electric, which were postponed by referring them to counsels Fish and Cravath, have been resumed. Well informed interests say that they stand a good chance of being brought to a successful culmination. The course of the stock during the week would indicate this, it having advanced from 33 to 35⅞ and is strong between 35 and 36 now.

It is understood that the General Electric Company stands a good show of securing the contract for electrically equipping the Manhattan Elevated. The success of the Chicago Metropolitan West Side project has been announced. Manhattan management has awaited these results before making its decision. All interests are very reticent, although it is virtually admitted that the matter is drawing to a head.

Edison Electric Illuminating of New York advanced in price, touching 99¾. The bonds sold up from 107 to 108½. J. P. Morgan & Company and F. M. Smithers & Company this week offered for public subscription at par flat, $1,986,000 first consolidated 5 per cent 100-year gold bonds, the same being a part of the $15,000,000 blanket mortgage, the terms of which were fully set forth in this column when the issue was authorized. The amount was subscribed twice over before the lists were opened.

On the Boston Exchange, Bell Telephone was steady between 201 and 202. Erie Telephone was unchanged at 57. New England Telephone was quoted at 107 to 108. There was no change in Electric Storage Battery at 28. General Electric preferred gained a point, touching 64. Westinghouse securities were firm at 32½ to 33 for the common and 52 to 52½ for the preferred.

"BAIN."

New York, June 1, 1895.

General Electric opened this morning 35⅜ and under heavy buying advanced to 36¾, which was its noon price. The appreciation was due to the deal between the Westinghouse and the General Electric, and when the negotiations are consummated much higher prices may be looked for. Insiders have secured their stock and are willing to see the price go up.

The management of the General Electric has been looking for successors for the two directors who left the property, and whose places were filled temporarily. The successors are to be men who will especially look after the development of the company along its present lines of policy. B.

Monday, June 3, 1895.

The Burning of Tesla's Laboratory.

Now that a little time has elapsed since the disaster which overwhelmed Nikola Tesla's laboratory, it is possible to sum up the significance of the event. Our sympathies have been with this unfortunate physicist from the first, and for good reasons. But the average newspaper man, who, by the way, was mostly extravagant with his commisseration, would probably hesitate to venture upon an answer were he asked to explain definitely what he was grieving about. The thing was terribly overdone at the time it happened, and, in illustration of this, we believe it to be a fact that one vivid young lady of the transatlantic press, in her anxiety to be instructive as well as "alive" in her descriptions, went so far as to depict herself undergoing a brilliant electrical ordeal, that is possible only with the body *in puris naturalibus!* For Tesla's future we have no fear. He is young and indomitable. It took Thomas Carlyle four weeks to quiet his mind after that miserable accident in which John Stuart Mill was concerned, which entailed the destruction of the first volume of the unprinted "French Revolution." But, in spite of sensational reports, we know it to be a fact that Tesla was at work again with clenched determination while the ashes of his hopes are still hot. No! The loss falls least heavily upon the loser. Like many another tireless experimenter, he hoped to give the scientific world the report of his failures as well as of his discoveries; he had not counted upon the casual distruction of his memorabilia and apparatus by fire. The loss falls most heavily upon those scientists who are at work upon the phenomena of high-frequency currents, of insulation, induction, impedance, and resonance, and the problems of obtaining cheap electricity by means of oscillators. In time, Tesla will doubtless reproduce all that was of value in those unfortunate notes and papers. In his own immediate work their loss will scarcely be felt, for his memory is all right, and flashes upon any experience of the past with the revealing power of a search-light. But the years of toil which his work might have saved experimenters by indicating the paths which are open as well as those which are blind, are gone forever.—*London Electrical Review.*

The way the New York Edison Illuminating bonds were snapped up would indicate a feeling of confidence in this class of securities.

LATEST NEWS.

The newest thing in catalogues will soon be sent out by the Metropolitan Electric Company, of Chicago. It is said to be a wonder.

Judge Williams, in the Federal Court at Little Rock, Ark., May 30, confirmed the sale of the Capitol and City Electric Street Railway companies to Henry C. Haarstiek, trustee, of St. Louis, for $630,000.

The Worcester, Mass., Electric Light Company are contemplating placing their wires underground and have applied to the City Council for permission to construct the necessary conduits.

The firm of Messrs. Warren & Lozier, New York, was dissolved June 1. Mr. Lozier retired to take up a new line of work. Mr. Warren will continue the business, which is said to be in a flourishing condition.

The Southern Bell Telephone and Telegraph Company has just opened a long line between Montgomery, Selma and adjoining towns, a distance of about 125 miles, and is now giving free service over this line, to the delight of the public.

In connection with the extension of the service in Belfast, Me., the New England Telephone and Telegraph Company has given its central office a thorough refitting. A new switchboard, made necessary by the greater number of connections, has been installed.

The Newark Electric Light and Power Company is about to be reorganized. It will have a new name and will begin business upon a much larger scale. The control of the company has been held for some time by the capitalists who control the Consolidated Traction Company. It is proposed to extend the wires of the company to all neighboring towns and to find a use for the current for small power purposes in the day time.

A Baltimore Tunnel Locomotive Finished.

The General Electric Company recently completed at its Schenectady shops the first of three electric locomotives for the Baltimore belt line tunnel of the Baltimore & Ohio Railroad. The machine worked smoothly and the results of the tests made are reported to be satisfactory.

Praise From England.

[*From Mechanical Progress, Broadbeath, Eng.*]

Our friends who edit and manage the ELECTRICAL REVIEW, 13 Park Row, New York, furnish their readers with much that is of great interest. Recently this weekly electrical publication, which, by the way, is the oldest in the United States, added several pages, with the intention of permanently enlarging their paper. Of course, this action tends to greatly add to their already high reputation.

PERSONAL.

Mr. W. H. Mackay, until recently with R. B. Corey, has been appointed manager of the New York office of the Columbia Incandescent Lamp Company, of St. Louis. Mr. Mackay's office is Room 1103 Havemeyer Building.

Mr. W. H. Freedman, E. E., was elected president of the Henry Electrical Club, 115 West Thirty-eight street at its last meeting. Mr. L. H. Laudy and Mr. Max Osterberg were elected president and vice-president respectively; Mr. Geo. Whitefield was elected secretary. The club passed resolutions of regret over the death of Mr. George M. Phelps.

Mr. Stephen L. Coles, associate editor of the ELECTRICAL REVIEW, and Miss Sallie E. Field, of New York city, were married Saturday afternoon, June 1, and will enjoy a fortnight's visit to Thousand Islands and Montreal. The many friends of Mr. and Mrs. Coles will extend congratulations and well wishes, in which the entire staff of this journal most cordially join.

W. A. H. Bogardus has resigned his place as secretary of the Brooklyn Heights Railroad Company and has fixed July 15 as the date of his retirement. He has received an offer from a business firm in New York city. Mr. Bogardus has served in the capacity of secretary, treasurer and general manager of the Heights road for two years, and was President Lewis's chief aid during the trolley strike.

A Handsome Lamp Catalogue.

The Columbia Incandescent Lamp Company, of St. Louis, has just issued a new catalogue in which President J. H. Rhotehamel feels a just pride. The cover design is embossed in gold and colors and shows a cherub shading his eyes from the rays of light emitted by a Columbia lamp. The reading pages are printed in a beautiful shade of red ink, and the lamp cuts are shown full size in black ink, the brass bases being tinted with gold. Incandescent lamps for every service with any standard base are illustrated and described in this catalogue, which is in itself a triumph of the printers' art.

To Providence by Steamboat.

The announcement that is so welcome to all travelers between New York and New England, the opening of the Providence Steamboat Line, has just been made. Passenger service was resumed on Monday of this week, and the steamers "Connecticut" and "Massachusetts" will leave New York at 5.30 P. M. daily, except Sunday. These boats leave from new pier 36, North River, one block above Canal street, and arrive at Providence, next morning, connecting with through trains to Boston, Worcester and other points.

An alleged inventor announces in a Lynn, Mass., paper that he can produce 1,000 sixteen candle-power incandescent lamps from one electrical horse-power. Young man, what a liar you are!

TELEPHONE NEWS AND COMMENT.

The Wizard Telephone Company has secured a franchise at Council Bluffs, Ia.

Lancaster, O., will soon have long-distance telephone connection with the principal cities.

A stroke of lightning recently burned out 100 lines in the exchange at Little Rock, Ark.

The City Council of Columbus, O., has granted a franchise to the Columbus Telephone Company.

The new telephone company at Pittsfield, Mass., is reported to have signed nearly 300 subscribers.

The Phœnix Telephone Company claims to have secured 2,000 subscribers in Indianapolis, Ind.

The new telephone company in Macon, Ga., is reported as being successful in securing subscribers.

The American Telephone and Telegraph Company has secured rights of way through Dansville, N. Y.

The Erie Telegraph and Telephone Company has completed four copper wires connecting Waco with Austin, Tex.

Mr. Charles G. Cockerill is installing a 50-station telephone exchang at Jefferson, Iowa, which will be in operation this week.

The Harrison telephone people have conceded to all the demands of the Greenville, Mich., council, and will commence work at once.

An opposition telephone plant is being constructed at Bellefontaine, Ohio. They propose to use the West telephone and the Gilliland switchboards.

The Southern Michigan Telephone Company has erected poles and strung wires for a telephone exchange at Vicksburg, beginning with a dozen subscribers.

Montgomery, Ala., is now connected by telephone with Lowndesboro, Benton, Orielle, Hazen, Uniontown, Founsdale, Demopolis, Perryville and Selma.

The Central Union Telephone Company are adding one mile of Patterson 52 pair cable to their plant at Springfield, Ohio, to accommodate the increase of subscribers.

The Rockland Telephone and Telegraph Company has accepted the franchise recently granted to it at Nyack, N. Y. Work has already been begun on the new system.

On June 8 a meeting of the subscribers of the Wisconsin Telephone Company will be held at the Academy of Music, at Milwaukee, to demand from the company a cheaper rental rate.

The Barry County, Mo., telephone company has up about 60 miles of country wire and connects Monett, Purdy, Butterfield, Cassville, Exeter, Washburn, Seligman and Mineral Springs.

At the annual meeting of the Sandy Spring, Md., Telephone Company the following directors were elected: Asa M. Stabler, Henry H. Miller, Dr. Roger Brooke, Frank M. Hallowell, Joseph T. Moore, Jr., and Tarlton B. Stabler.

A complete telephone system will shortly be put into operation on the Metropolitan "L" Road in Chicago and every station on the main line and branches brought into direct communication with the central office of the road.

The Central Union Telephone Company has reduced telephone rates at Shelbyville, Ind., to $12 per year for business houses and $8 for private residences. Local business men recently installed a rival exchange at a reported cost of $10,000.

Messrs. Talbott & Vanhorn, who received a franchise from the City Council of Springfield, Ohio, for the construction of an opposition telephone exchange, have decided to surrender the franchise since the decision of the Court of Appeals in the Berliner case.

The reduction of telephone rental to $25 for offices and places of business and $20 for residences is causing large increase in subscribers in Maine towns and cities. Pittsfield has a new circuit of 20 subscribers; Gardiner has 80 new ones, Belfast 40, and Hallowell 20.

Superintendent C. P. Wainman, of the Northwestern Telephone Exchange Company, has issued notices warning all persons in his company's territory immediately to discontinue the use of all battery transmitting telephones other than those furnished by his company.

There is no more important subject now being discussed than that of the telephone. The country is full of "promoters," most of whom have named such absurdly low rates for telephone service that the public has been led to think that the business is all income, with no expense.—*Ohio State Journal.*

Herbert Cottrell, of Newark, N. J., has received a United States patent and a Canadian patent on a telephone without electrodes, which operates on the principle of an electrical shunt, having a path of high resistance and a path of low resistance, whereby the necessary variations in the current may be produced.

Mr. John A. Tompkins has been appointed by the Maryland State Telephone Commission as expert accountant to examine the books of the Chesapeake & Potomac Telephone Company, and to report whether or not it is possible for the company to furnish telephone service at a price less than that now fixed by law.

John Starr, Son & Co., of Montreal, Canada, have just been awarded the contract for installing a complete telephone exchange for 50 subscribers at Campbellton, N. B., including switchboard, telephones, wires, etc. Messrs. Starr have also just received an order through their Quebec agents for five standard switchboards with the necessary telephones.

It is rumored that the position on the board of directors of the Erie Telegraph and Telephone Company, made vacant by the death of ex-Governor James A. Weston, of Manchester, N. H., has been offered to a leading Boston financier. The matter will not be settled until the first meeting of directors after the annual meeting in June, probably June 29.

The seventeenth annual meeting of the shareholders of the South Jersey Telegraph Company was held on May 21 in Camden, N. J. The following directors were elected: C. A. Tinker, George Merrihew, James Merrihew, Henry Bentley, W. T. Westbrook, S. M. Plush and W. B. Gill. These organized by electing James Merrihew, president; W. B. Gill, vice-president; C. A. Janke, secretary; W. J. McLaughlin, treasurer; W. T. Westbrook, manager.

The Framingham Telephone Company, organized under Massachusetts' laws and capitalized at $150,000, has applied to the Framingham selectmen for the right to introduce a line of telephone service and have a concession for 65 years. A public hearing will be given this week. Behind the project are A. W. Worthley, H. H. Hunt, George H. Conant, Moses S. Case and M. F. Maher, all of Boston, except the latter, who is a Framingham man. These gentlemen are already interested in similar enterprises.

Work will be commenced at once on the telephone lines through southeast Alabama, via Union Springs, Troy, Eufaula and Columbus, Ga. As soon as this is completed the lines will be extended to Mobile, belting that section of the State, and then on to Birmingham, where the towns of the industrial region will be linked with those of the cotton belt and the piney woods. Within three months Macon and Atlanta will be on the line. These two Georgia cities are already connected by telephone and it is intended that the Alabama line which reaches Columbus shall be extended on to Macon. The Southern Bell Telephone Company has seven States in its territory, and promises before the end of the year to have all of the important towns and cities of the South brought into talking distance with one another.

Niagara Falls Power.

[*From the Boston News Bureau.*]

We have investigated, through Buffalo sources, the report that the attempt to furnish electric power by the Niagara Falls Power Company at the city of Buffalo has proved a failure, and are informed that the electric generator in the power plant is doing all and more than it was expected to do and that the second one will probably be completed in June.

The visible work of the Power company at present is the improving of its ground, grading and putting up fences and cutting the great seal in the stone arch of the power house. The Pittsburgh Reduction Works, the largest aluminum works in the country, are in readiness to use the power as soon as they receive it, and the Carborundum Works are rapidly approaching completion.

Our informant says: "I shall be disappointed if we don't find the power delivered to manufactories in the very early future, and there is no question in my mind but the power companies are perfectly satisfied with their investment, and all tests made up to the present time."

Regarding removal of the Schenectady and Lynn plants of the General Electric Company to Niagara Falls, nothing is known at the Falls regarding it. Mr. John Jacob Astor and other prominent capitalists were at Niagara last week in a private car, inspecting the plant.

From other sources we are informed that a "fight is on" between the Power company and the Buffalo city fathers. The Power company desires an easy franchise to sell electricity in Buffalo, which the City Counsel refuses to give, and this is how the report originated that electricity could not be delivered in Buffalo as cheaply as steam.

Are General Electric Shops to be Concentrated at Schenectady?

[*From the Schenectady, N. Y., Star.*]

A movement that means much for the business interests of the city of Schenectady is under way, and is expected to reach a conclusion next week. It is a movement for the consolidation of all the several General Electric and Edison companies, with the object in view to locate them all at Schenectady. In order that this result may be obtained, there are certain concessions asked for by the representatives of the movement—the committee being at present in town for that purpose—and more land will be required, viz., all of the strip lying between Kruesi avenue and the New York Central Railroad and the New York shops and the D. & H. Railroad. This property, it is claimed, can be purchased cheap. In the event of the successful culmination of these plans, the present force of the General Electric plant here will be at least doubled, making between 8,000 and 9,000 hands employed.

His Favorite.

To the Editor of Electrical Review:

I take several electrical papers but the Electrical Review is my favorite. Yours truly,

S. C. F.

Arcadia, Fla., May 27.

ACCUMULATOR BATTERY FOR TELEGRAPHIC PURPOSES — DIRECTIONS FOR INSTALLATION AND MAINTENANCE.

BY HARRY HOFMEISTER, IMPERIAL GERMAN TELEGRAPH DIRECTOR, EMDEN, GERMANY.

(*Concluded from Page 285.*)

TESTING.

For testing the accumulator and charging batteries two galvanometers, one galvanoscope and a voltmeter are provided. The three former are permanently in circuit as shown in Figs. 9, 10 and 11. The voltmeter is apart and only inserted during the test. To insure perfect contact and to save error, the voltmeter is provided with a hand-piece Y to which it is joined by flexible wires.

The hand-piece is made of hard india-rubber and contains two metal pins, connected through the flexible wires with the coils of the voltmeter. The pins protrude from the hand-piece and are provided at the end with a small metal spring, which, when the instrument is not in use, does not touch the pin. From each tenth cell of the accumulator a wire (shown in Fig. 11) is lead to an umschalter U, consisting of a paraffine-saturated board on which 16 short metal bars in two parallel rows are fixed. The distance between the bars is the same horizontally and vertically, and corresponds to the distance between the two pins of the hand-piece. By this means any two adjacent bars can be brought into the voltmeter circuit and the potential measured. Connection is

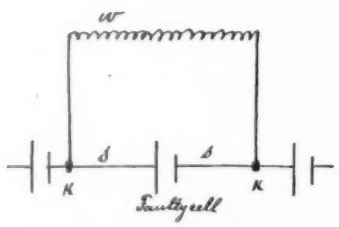

FIG. 12.—CONNECTIONS AROUND A FAULTY CELL.

made through the small pins on the end of the pins, so that the latter are not burned by the spark. Between each of the bars in the upper row coils of wire are inserted, each of which has the same resistance as the coils of the voltmeter. The last bar to the right is joined to earth. The wires from each tenth cell of the battery are lead to the bottom row of bars, that from the first 10 cells to the right-hand bar and so on, so that, proceeding from right to left, each couple of vertical bars have a greater tension than the previous pair.

Pressing the hand-piece on the first two bars (right, vertical), the voltmeter indicates the potential of the first 10 cells of the battery, on the next two bars the potential of 20 cells, the next two that of 30 cells and so on.

The voltmeter has a compass of from 10 to 25 volts, and can only directly indicate the potential of 10 cells. By the use, however, of the coils between the upper row of bars, the resistance in the testing circuit is doubled, trebled, quadrupled with each additional group of cells. By this arrangement the deflection of the needle should be nearly the same for any number of groups of cells.

The exact potential of the different groups may be got by multiplying the reading by two, three, four, etc., according to the number of groups tested. The actual deflection is, however, a sufficient guide.

By pressing the hand-piece on two horizontally adjacent bars the potential of any row of 10 cells is recorded. Thus, by pressing on the fourth and fifth bars from the right the tension of the cells 41 to 50 is recorded.

The accumulator should be tested twice daily, at eight in the morning and at four in the afternoon. The entire battery should first be tested, then the half. If the needle shows a deflection of over 19 and less than 21, the battery is in good order. If, with either whole or half battery, the deflection falls below 19 or rises above 21, the groups of cells must be separately tested, firstly by joining pairs of bars vertically with the hand-piece to obtain the potential of 10, 20, 30, 40, 50, 60, 70 and 80 cells, and then by joining horizontal pairs to get the potential of each group. So thorough a test as this will, as a rule, only be necessary every 14 days.

The strength of the charging current in each division should also be read and recorded twice daily. All these observations should be noted in a book ruled as in Addendum 1. Each page contains place for the daily tests for eight days. At the foot of each page space is provided for the results of the detailed tests, whether fortnightly or at such times as have been found necessary. In this book only the actual readings in the voltmeter are necessary.

The alarm circuit in the earth line should also be tested twice daily by connecting one of the wires from a distributing bar with the earth terminal in the battery umschalter. A current of one ampere flows through the relay and rings the bell.

Addendum 1.

Date.	Hour.	Potential. The whole Battery Deflection + 8 Volts.	Potential. Half Battery Deflection + 4 Volts.	Charging Current. 1st Division Amp.	Charging Current. 2d Division Amp.	Remarks.
	8 a. m.					
	4 p. m.					
	8 a. m.					
	4 p. m.					
	8 a. m.					
	4 p. m.					
	8 a. m.					
	4 p. m.					
	8 a. m.					
	4 p. m.					
	8 a. m.					
	4 p. m.					
	8 a. m.					
	4 p. m.					

FAULTY CELLS.

In testing the potential of the battery, as above, it was proved that the deflection in the voltmeter is practically the same whether the whole battery is being tested or one group of cells. In general, the cells of a battery supplied from the same charging cells show a slight decrease of potential the nearer they are to the earth line, the cells in the latter position being somewhat harder worked than the others. In testing the accumulator by the first method, viz., by pressing the hand-piece on vertical pairs of bars, the needle should show a slight but gradually increasing deflection as the hand-piece is moved from right to left. If a falling off in the potential is observed, a faulty cell is the cause and its whereabouts may be found by testing the individual groups. The fault may be either a bad connection in the distributing circuit or a defect in the cell itself.

The former may be discovered in the usual manner, the latter by close examination of the cells. The fluid in the cells should be clear and should cover the plates to the prescribed depth. The plates themselves should present a normal appearance, the negative showing a leaden gray color, the positive dark brown or almost black. Short circuit may occur in a cell, caused by loosened pieces of the metals or by some foreign substance making metallic connection between the plates, and this causes the positive plate to lose its color and assume that of the negative plate.

Defective cells must be immediately taken out and replaced by others from the reserve battery. To this a copper wire of two ohms resistance is wound on a reel and suspended over the faulty cell by means of a cord fastened to the shelf above, *w*, Fig. 12.

After removing the varnish from the leaden connecting bars at each side of the faulty cell, the ends of the wire *w* are clamped or screwed on K K. The leaden bars may now be cut through at *s* and the cell removed.

The first cell in the reserve battery is now taken out (the circuit need not be immediately reclosed) and put in the place of the one removed, connection with adjacent cells being made by soldering the leaden bars by the method already described. The wire *w* should be removed immediately this connection is made so as to avoid any protracted short circuit. If the faulty cell can be repaired, it should be, and placed in the reserve battery; otherwise a fresh cell must be fitted up and inserted, so that the charging of the reserve cell be resumed as soon as possible.

The foregoing proportions and estimates are adapted for large stations. If it should be necessary to provide a potential of more than 160 volts for a particularly long line, the additional power should be furnished by additional copper cells. Such cases will only seldom occur. In the most important relay stations with long underground lines an accumulator of 30 cells will be found sufficient. In such cases the charging battery need only consist of one division, by which the arrangements are much simplified.

The copper cells of the charging battery are to be treated in every way the same as those in ordinary use.

To arrive at an estimate of the economical worth of the accumulator an exact account of the consumption of copper vitriol and zinc rings in the charging battery should be kept, and a statement of the number and description of the circuits and lines supplied, with the dates on which first served and, where the service has ceased, the date of cessation.

Date.	Hour.	Potential of 80 cells + 8 V	70 cells + 7 V	60 cells + 6 V	50 cells + 5 V	40 cells + 4 V	30 cells + 3 V	20 cells + 2 V	10 cells — V	Potential Separate Groups. VIII 80th to 71st cell V	VII 70th to 61st cell V	VI 60th to 51st cell V	V 50th to 41st cell V	IV 40th to 31st cell V	III 30th to 20th cell V	II 20th to 10th cell V	I 10th to 1st cell V	Remarks.

AN UNPREMEDITATED EXECUTION.

BY HERBERT LAWS WEBB IN "ELECTRIC POWER."

McGraith and Gurney had finished their luncheon in a downtown restaurant. The empty cups that had held their *café noir* had been pushed to one side and the tablecloth was covered with penciled diagrams of electrical circuits. The restaurant was almost deserted, as it was past three, and the waiter in charge of their table wandered disconsolately to and fro, casting occasional disgusted glances at the two sitters and the illustrated tablecloth. He was anxious to clear up and get off for his afternoon rest before going to his evening post at an uptown resort in the Tenderloin district. But McGraith and Gurney were too deeply engrossed in discussing an invention of the latter.

"I tell you," said McGraith, doggedly, "it won't work. It won't start with a load on, even if it will start by itself at all, which I doubt very much. You can figure it out by mathematics as sweetly as you please, but when you come to build the machine the only formula applicable will be a very simple one—*n. g.*"

"That's all you know about it," responded the other, nettled by McGraith's unqualified incredulity; "and, as for figuring things out mathematically, if you only did a little of that sort of thing yourself sometimes you might save your company money." This was a home thrust, as McGraith had only lately laid out an electric lighting system in such a way that 35 per cent of the current was lost before it got to the lamps, and the company had to put down new cables at great expense.

"Well, that's neither here nor there," said McGraith, testily; "any man's liable to make mistakes sometimes. And, besides——"

"Ah! here comes a man who knows something about motors and he'll bear me out, I bet." Gurney interrupted the other's explanation as he saw a tall figure enter the door at the far end of the room and rapidly bear down on them.

"Why, as I live, it's Billy Black!" exclaimed McGraith, as he turned in his chair. "I thought he was out West for good."

"He never stays anywhere very long; the places he favors with his valuable services generally get too hot to hold him in a month or two," said Gurney quickly, just as the newcomer got up to them. "Why, Billy," he added, "where have you descended from? You've just come in time to give an opinion on this scheme of mine that McGraith says won't work."

"Scheme! Don't, for Heaven's sake, talk to me of schemes! I've done with electrics for good. I'm looking for a job to go to South America or Siam as a dry goods drummer to give my shattered nerves a chance!"

"Why, what's up, man? What have you been doing now? Not trying those experiments on nerve induction again, I hope." (Gurney referred to another wild scheme of Billy Black's that would be worth telling about, but not here.)

"Oh, no. Not that at all. Once was enough, thank you. You fellows did not know what I went West for this time, did you? Well, I will tell you, but it is a long story and not altogether a pleasant one." Mr. Black called the waiter and ordered oysters, soup, a large cup of coffee and a chocolate eclair. "I haven't had anything to eat since I breakfasted on the cars this morning. I went to your office," nodding at Gurney, "after leaving my valise at my diggings and they said I would likely find you here, so I followed you up, as I knew you'd be interested in this little affair. I'd really rather not tell it to any one, but it has given my nerves such a shake-up that it will be a relief to see the effect on some one else. I've had to bottle it up so far and I feel like an overcharged condenser; my insulation will break down if some of the charge isn't released pretty soon. If you chaps will keep me company I'll spin you the yarn. It's lucky you've had your lunch or I'm afraid it would be spoiled."

Black spoke in a nervous, constrained way, quite at variance with his usual easy manner when engaged in recounting his highly original experiments and the curious adventures they sometimes led him into. The others, especially Gurney, who was Black's greatest chum, saw that there must be something out of the common in his latest experience. They exchanged nods and Gurney said:

"Why, Billy, to hear you talk anybody would say that you had got rattled for once in your life. Pull yourself together, old chap, and let her go. I think I'll let the office take care of itself this afternoon and I guess McGraith feels the same way."

McGraith nodded a silent assent.

"Well," began Billy, as soon as he had dispatched his oysters, "you know, of course, that a few months ago, in one of the States out West, the legislature passed an electrocution law. Wanted to be up-to-date, and as they thought the thing had been a success down here they decided to adopt it. It appears that they had heard of me through that train experiment of mine. You remember, the electric trap for the train robbers, and I was invited to become State electrician.

"Now, you know I have paid considerable attention to the electrocution business. The bungling jobs that have been done down here disgusted me, and I got up a complete scheme, generating plant, switchboard, chair and all. It was perfect, simply couldn't fail under any circumstances. Naturally, I couldn't try it to make sure, and the people up there," pointing with his spoon in the direction of Harlem, "declined to throw out their plant and put in mine, in spite of all the trouble theirs has given them. Bah! this soup is horrible. I can taste carburretted hydrogen and sulphur and all sorts of abominations in every spoonful. There's a chance for some fellow to make a fortune by starting an electric restaurant in this town. He'd have to take a 10-story building in a few weeks to accommodate his customers."

"Yes," said Gurney, "and another to generate his current in. Go on with the yarn."

"Well, of course I accepted the proposal at once, as it was just the opening I wanted. Splendid opportunity to demonstrate the workings of my scheme. I wrote and told the authorities that they could not have selected a better man, as I had given long and serious study to the question of electrocution, and had worked out a complete system which I would stake my professional reputation was far superior to anything at present in use. You know I have attended two little affairs up in the State here as a newspaper reporter and I never saw a viler layout in my life. I gave 'em a scathing criticism in my report, but the editor cut it all out, though he complimented me on my realistic description of the proceedings.

"Just before I was about to start off, after all the preliminaries had been satisfactorily arranged, our friends up at Auburn brought off their last bungling job, and the affair gave them such a fright that they wired me to go up to put in my system. I politely intimated that they were too late, as my valuable services had already been engaged elsewhere. They entreated me to at least let them use my system, even if I couldn't superintend matters personally, but I enthusiastically declined. I felt that I couldn't trust them to work it properly, for one thing, and for another I wanted to try it first myself. I even postponed consideration of a royalty of $250 a murderer, which in New York State would mean a pretty tidy income, in spite of the many slips between the crime and the dynamo. No offer that they could make would tempt me to enter into any arrangement until I had the satisfaction of giving the system a fair trial under my own supervision—you know how an inventor feels about those things. There are always chances of mistakes, and even of some jealous beggar faking things so as to prevent them going right, and one likes to be on hand oneself at a first trial.

"You see, if I had let them put in my system, and they had gone and done the usual cooking act or had a breakdown of any sort there'd have been another flare up in the papers, and, of course, the prison people would have put all the blame on me and spoiled my reputation with future customers in the electrocution business." Mr. Black put on quite an injured expression and ran his long fingers through his thick hair in the excited manner common to him when elaborating a point. His listeners nodded their appreciation of his argument that he was fully justified under the circumstances in refusing to allow his apparatus to be used except under his own supervision, and he went on:

"Well, I hied myself out West with all my gear and found the authorities, and even half the town, in a great state of curiosity to see the State electrician and his dead-sure system of electrocuting. No issue of the local papers was complete without a paragraph about 'Electrician Black and His Deadly Volts,' or 'Inventor Black and His Crime Exterminating Dynamo.' The worst one of all was a biographical sketch, illustrated with a cut that must have been the portrait of the most fiendish murderer the State had produced, and with a scare heading: 'Assassins Beware! Black Care Lurks Behind Ye! His Lightning Machines Are Ready to Flash You Into the Next World! Career of William F. Black, the State Electrician Just Arrived from the East.'

"The papers did full justice to the train-robber business, and I had to tell the story of that little adventure until I was sick and tired of it. Of course, I had to deal most with the warden of the prison and I soon got his measure. He was the average type of ward politician, the kind of man who, if he hadn't gone in for practical politics, would have been well off as a janitor or doorkeeper. But he was a good sort and we were soon capital friends. He was a director of the local electric light company, and although he scarcely knew the difference between a transformer and a telegraph pole he felt bound to pretend to a general knowledge of electrics. When I had the apparatus all unpacked he wanted me to explain the working of it in detail. I did so. At first he looked very wise and followed me most impressively when I told him how the engine turned the dynamo and the current was generated. He got in his 'yeses' and 'hms' all at the right points. But when I branched off into negative and positive electrodes he looked alarmed and thoughtful; and on my attempting to go into the matter of frequency of alternation of the current and its physiological effect, he got so rattled that he broke in and asked me to go out and have a drink. We talked about horses over our drinks, and he never asked me for further information about the plant. When people asked him questions he told them that Mr. Black had explained everything to him and he was quite satisfied that the system was the most perfect that could be devised for the purpose, and he had the fullest confidence in Mr. Black's experience and ability. Poor chap, I wonder if he's of the same opinion still. Afraid not.

"When I got everything in place and connected up nothing would content the warden but to give a reception to the principal officials—Governor, Sheriff, Mayor—in fact, all the big cranks and bosses of the State and city political machine. He insisted on my giving a lecture, and by way of a practical experiment, to convince them that everything was in working order, on sacrificing a calf. I urged that the calf wouldn't show off the best feature of the system, as I couldn't set him on the chair. But Mr. Warden said that didn't matter; we had to show them we could kill something, and a calf was the cheapest thing to kill, besides being a good size for the money.

"I gave the lecture and the calf stood silently by. When the cranks and bosses began to ask questions I envied the calf for being able to smile without risk of giving offense. He did smile several times, and if he hadn't I should have had no compunction in killing him as an animal absolutely destitute of all sense of humor. I worked myself into a state of semi-collapse in struggling to keep up a scientific air while I answered

all the fool questions that were fired at me. At last, in sheer desperation, I hurried up the final act and touched off the calf. I felt quite sorry for the poor beast, as he had been the only one present I felt any sympathy with. He dropped like a stone, and there was no trace of any burning or singeing at the points of contact. That settled the question of the efficiency of the apparatus most forcibly, and all the cranks and bosses turned round and went home quite satisfied.

"The new law went into effect the next day, and one of the papers headed its report like this: 'Volts Make Veal. The New Electrocution Plant Successfully Tried on a Calf. Electrician Black Has a Vacant Seat to Offer the Next Spiller of Human Blood. He Explains the Working of His System to a Distinguished Audience. The Law Takes Effect from To-day.'

"There happened at the time to be no murderer under sentence, and for about a month I had a pretty easy time of it. I was working on some experiments on electric cooking, trying the effect of passing some of the current through the materials while the cooking was going on. The results were interesting, but not altogether satisfactory; in some cases I succeeded in completely altering the flavor of my dishes, but not exactly for the better. Still, I think there's something in it, and I have hopes yet. What I am aiming at is to give beef and mutton a distinct gamey taste and consistency by shunting some of the current through the joints while carrying on the cooking by electricity. There's heaps of money in it if it will only pan out well. Fancy what it means to be able to make tough meat tender, and to give to ordinary beef and mutton the flavor of a delicate bird—why, it would be better than inventing a new animal.

"However, that has nothing to do with the present matter. While I was deep in the electrified meat problem a murder was committed right in the very town. It was rather a brutal affair. Two fellows quarreled about a girl, and the upshot was that one shot the other dead in the presence of witnesses. The murderer had been heard to threaten that he would kill the other, and he fired half a dozen shots straight into him; so it was a pretty clear case. He was a young man, a comparative stranger in the place, and not at all well off; he called himself a journalist, as he made a living by doing odd jobs of reporting and canvassing for the papers.

"Well, sir, that murderer didn't have a chance. Certainly it was a pretty bad case, but no worse than lots of others where things are stretched out for years and the capital sentence avoided after all. But the people wanted to have that electrocution apparatus put to the test, and the trial was just the quickest I ever saw or heard of. The poor beggar didn't have much money to spend on a defense, but he got hold of a clever young lawyer who worked the case up most ingeniously. It wasn't a bit of use. The jury would scarcely listen to him, and they brought in a verdict of guilty after having been out about five minutes. The trial was a big sight more of an object lesson to prospective murderers than a dozen electrocutions, I can tell you. The murder took place on a Monday and the man was sentenced on the following Friday.

"From the day of the trial to the day set for the execution the warden was in a fever of excitement. He was like a lineman who had been suddenly promoted to be superintendent of a big company, and he made the most ridiculous ass of himself possible to imagine. He was empowered by the law to invite a certain number of witnesses and no more; and so that the lustre of his own importance should not be dimmed by the reflection of any other lights, he took care to invite only a lot of junior reporters and three young doctors, two of them just out of the hospitals and one still serving his time. The invitations were non-transferable, and he insisted that each witness should be identified before he was allowed to enter the prison, so there was no getting around his arrangements.

"If you could only have seen the motley gathering of harum-scarum young devils that that precious warden got together at the prison you wouldn't have wondered at what happened. It was no good trying to make them keep quiet or understand the gravity of the occasion; they were worse than a lot of college boys at a football game, and I gave it up as a bad job. The warden was in a state of spirituous exultation, as he had been trying to soothe his nerves and had lost count of the doses of whiskey, his only medicine.

"At the last moment, just as they were about to bring in the murderer, I had to go off to have a last look at the dynamo and switches. I had got steam up a long time before and had a trial run before the witnesses came in, and I knew everything was in good shape, but I wasn't quite sure of my dynamo-tender. I turned to the crowd as I left the room and said, 'Now, gentlemen, let me beg of you not to meddle with the chair in any way; you might seriously upset my arrangements by touching any part of it.'

"'That's all right, old chap,' said one of them; 'there isn't any "juice" on, is there?'

"'No,' said I, 'the current isn't turned on yet, but it will be very soon and you'd better keep clear of the chair anyhow.'

"With that I went down below and gave the dynamo-tender his last instructions, especially about the signals and about some special observations I wanted him to make. Just as I had finished talking with him I had word that the murderer was on his way to the chair and I clapped down the main switch and turned to go upstairs. Before I had got out of the room the man called out to me and pointed at the ammeter. I looked and saw the needle moving over. It didn't need the sound of some one clattering down the steps to tell me that something had happened, and I jumped for the switch, pulled it wide open and rushed for the stairs, calling to the man to shut down the engine. One of the medical students fell into my arms on the stairs, yelling out, 'Stop the machine. You've killed the wrong man!'

"The wrong man had been killed, sure enough. When I got back to the room the first thing I saw was the chair. One of the young reporters was lying back in it, limp as a stuffed dummy. The others were gathered round, staring in a stupefied sort of way, and even the prisoner, the jailers and the warden had joined the throng. One of the reporters, whose instinct for copy was not to be downed, even in the face of such a catastrophe, was standing a little apart taking notes for all he was worth. There they all stood, stock still, saying nothing and doing nothing. The thing had evidently been so sudden that it had knocked all speech and thought out of them, and they were afraid to touch anything.

"'The current is off, men alive!' I yelled. 'Get him out quick and try to bring him to.'

"That broke the spell. They got him out and tried to bring him to. The three medical men worked like beavers, but it was no go. The man was as dead as if he had been killed the week before last. After a few minutes one of the reporters wanted to rush off for a doctor from outside, but at that the warden woke up.

"'No one leaves this room until this thing is cleared up,' he said. 'All the doctors in the country couldn't bring that man back to life. Mr. Black has done his work too well.'

"At that I asked what had happened after I had left the room to look at the dynamo. The cool-headed reporter who was taking notes explained. They had all made a close inspection of the chair. Then one dared another to get into it and there was some chaff, but finally one of them actually got into the chair—'just to be able to say he was the first to occupy the new seat of judgment,' as he put it. He never said that but once. I must have closed the switch at that moment, and one of the best points in my system is that when once a man is in the chair failure is impossible, for the contacts are automatically made by his own weight in the chair, and a switch, concealed in the seat, is closed and completes the circuit back to the dynamo by a third wire. The idea of this was that the man really kills himself, and the closing of a switch by a convict is not necessary. It all worked perfectly. The chap got the current the moment he got fairly seated and he must have been killed several seconds before I pulled open the main switch when I saw something was wrong.

"The medical students at last gave up working, as they saw that nothing could be done. We all looked at each other, but everybody seemed to be looking chiefly at me. I naturally felt a bit proud that the system had worked so well, but I concealed my feelings and explained what I have just said and expressed my deep regret that they had not taken my warning to heart and abstained from meddling with the apparatus. That left things about as they were before, and when I had finished explaining we continued to look at each other. Finally the warden came to the scratch.

"'Now look here, boys,' he began, 'there's only one way out of this thing. We're all in the same boat. There's bin an accident. A jury might call it murder, or hummycide, or somethin' ugly like that. I may be responsible or Mr. Black here may be, as he turned on the juice, but really we're all responsible. And you bloomin' jays the most so for monkeyin' with the chair. Now, we've got to see each other out, an' I only see one way. There was to be an electrocution here this mornin'. Well, there's bin an electrocution. The wrong man was touched off, but it needn't go any further. See?'

"They evidently saw. There were several low whistles, but no other interruption, and the warden went on rapidly:

"'Now, it is just about the time to run up the black flag, an' we'll run it up. We all take a solemn oath to keep this thing to ourselves, an' you all write your stories from just what you've seen, and just as if the thing had went off properly. It won't be any worse a fake than many you've done afore this, anyhow. As for our friend here,' nodding to the murderer, 'he'll have to go. He's just about the same build as the young man there what met with the accident, and as he took his place, why, now this 'un 'll have to take his.' 'An' you'd better just make yerself scarce for to-day,' he said to the man, 'an' get around to his room to-night, pack up his traps, an' clear out of this place for good. Now, boys, have I made myself clear? Is there anything I've forgot?'

"The warden had certainly made himself clear enough, and his plan showed a capacity for organizing and a boldness that quite staggered me. I expected his scheme would have the same effect on the others, and that they would scout at it. But nothing of the sort. Those western chaps can assimilate anything, I think. The warden's plan was accepted almost without discussion. He gave the order to hoist the black flag, and then they fell to arranging the details. How they managed it all, I don't know, but they did manage it. The murderer went off in the clothes of the unlucky reporter and wrote an account of his own execution for an evening paper. He spoke very kindly of the remarkable efficiency of my system and of the perfection of all my arrangements.

"I handed in my resignation as State electrician that afternoon and started back East the same night. Now I want to get as much farther East as I can. Know anybody in the dry goods business?"

The New Officers of the Brush Electric Company.

The recent annual election of officers of the Brush Electric Company, of Cleveland, O., resulted in the following board: Robert Treat Paine, Boston, successor to W. H. Lawrence, who resigned the presidency; J. P. Ord, Schenectady, vice-president; C. G. Smedberg, Cleveland, secretary and treasurer (Mr. Smedberg was formerly assistant treasurer of the General Electric Company); S. M. Hamill, Cleveland, general manager; C. N. Black, Cleveland, superintendent; Franklin Sneider, assistant superintendent.

The Brush Electric Company recently acquired the Swan incandescent lamp and the factory equipment, and will in future control the market for the Swan lamp.

The Swan lamp is well-known throughout the world, not only because it bears the name of the celebrated electrician, Joseph Swan, but because it is widely used in foreign countries. The Swan Lamp Manufacturing Company was organized in 1885 and has, until its purchase by the Brush company, rented factory room from the Brush Electric Company. The Brush Electric Company's going into the manufacture of incandescent lamps is a new departure, but one which will undoubtedly meet with the approval of the trade.

The new incandescent lamp department of the Brush company will be under the direct supervision of the superintendent and assistant superintendent, but will be operated by a foreman who has had a long experience in the manufacture of incandescent lamps. The sale of the incandescent lamps and the handling of the business will be done by the different departments of the Brush company.

The actual cost of running the electric light plant at Mattoon, Ill., is reported to be $40 per light per year. With interest added at five per cent on a $16,000 valuation the cost is $48.20. The city owns the plant.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Telephone and Telegraph Companies.

DURAND, WIS.—Negotiations are going on to establish a new telephone line here.

HOLLIDAYSBURG, PA.—A new telephone line will be put up between this place and Martinsburg.

FORESTVILLE, N. Y.—The Hanover Telephone Company is represented by E. H. Wiggins, W. F. Smallwood, John Tuxford and P. O. Towers.

BALTIMORE, MD.—The recently organized Home Telephone Company expects to be ready for business December 1.

INDIANAPOLIS, IND.—The Frankfort Telephone Company has been incorporated. Capital stock, $15,000.

CENTREVILLE, N. Y.—A new telephone line has been completed between this place and Port Jervis.

ALBION, N. Y.—The Norton-Troutburg Telephone Company is making arrangements to extend its telephone line to Holley.

TALLAHASSEE, FLA.—Messrs. George W. Saxon, W. A. Rawls, James D. Randall and M. B. Rice have applied for a charter as the Florida Telephone and Construction Company, with a capital of $10,000 and headquarters at Tallahasse.

RUFORD, GA.—A telephone line is to be established here.

WINNEBAGO CITY, MINN.—Blue Earth Valley Telephone Company has been incorporated with $50,000 capital stock.

STANDISH, ME.—The New England Telephone Company have asked to be allowed to establish a telephone system.

NEW AUBURN, MINN.—A telephone company has been organized at this place for putting in a telephone system between here and Glencoe, a distance of nine miles. The company will be known as the New Auburn & Glencoe Telephone Company. The officers are as follows: President, Wm. Reimers; vice-president, John Supple; secretary, Jacob Koons; treasurer, A. Streich.

AVON, N. Y.—A long-distance telephone line is being constructed from this place to Williamsport, Pa., to connect the two trunk lines to the West.

GREAT BARRINGTON, MASS.—The telephone company is making arrangements for placing its wires underground in Lenox and for establishing an exchange. A number of new subscribers have been obtained.

SILVER CREEK, N. Y.—Hanover Telephone Company has been incorporated; capital, $1,000. Directors, R. J. Quale, R. M. Evarts, E. Thomas and others, of Silver Creek.

WALLINGFORD, MASS.—The Southern New England Telephone Company has opened a new office here.

COLLINS, MO.—The citizens of this place are talking of forming a joint stock company for the purpose of erecting a telephone line between this place and Humansville, Mo., to connect with other lines.

TOLEDO, O.—The Commercial Telephone Company has filed articles. Its capital is $5,000 in $100 shares. The incorporators are G. R. Struble, L. E. Baker, H. A. Shanklin, S. E. Clapp and Denton Camery.

LOUISVILLE, ALA.—A telephone line is to be established here.

CADE'S STATION, LA.—The Teche and Vermillion Telephone Line has completed its lines to this place.

BURLINGTON, VT.—George D. Sherwin, of this place, has contracted to furnish and equip a 12-mile telephone line connecting Grand Isle with Alburgh. A cable will be used across the lake at the drawbridge.

SOUTH FRAMINGHAM, MASS.—The Framingham Telephone Company, organized under Massachusetts' laws and capitalized at $150,000, has applied to the Framingham Selectmen for the right to introduce, and have a concession for 65 years, a line of telephone service for connection with houses, stores, places of business, etc.

READFIELD, ME.—The Readfield Telephone and Telegraph Company has been organized with an authorized capital of $10,000, of which $300 are paid in. The officers are: Hon. Emery O. Bean, president; Hon. W. W. Norcross, treasurer, and B. W. Harriman, N. D. Gordon and H. E. Trefethen, directors.

CLARKSVILLE.—A corporation for the purpose of building a telephone line between this place and Jerusalem has been organized. One hundred and eighty shares have been sold. The following officers have been elected: President, Cornelius Slingerland; vice-president, R. C. Bagley: secretary, Charles Hummer; treasurer, S. J. Wright; manager, C. L. Shear. The following directors were also elected: M. F. Barber, J. M. Wright, A. Houck, Elmer Shear, Hiram Weidman, Andrew Joslin, Casper Mead and George Rothaupt.

W. CHESTERFIELD, MASS.—A telephone line is to be established here.

COLUMBIANA, OHIO.—A central telephone office will be established here.

Electric Light and Power.

HERINGTON, KAS.—Herington Electric Light and Waterworks Company reported as having conveyed plant to city for $26,800.

NEWTOWN, QUEENS CO., N. Y.—The Newtown Light, Heat and Power Company, incorporated by J. C. Smith, of Babylon; Francis McKenna and George S. Jervis, of Maspeth, and others to manufacture electricity for power, light and heat. Capital stock, $20,000.

LA FAYETTE, ALA.—R. J. Moore will put in a $3,000 electric light plant.

LANCASTER, TEX.—The Lancaster Water, Light and Ice Company has been incorporated by R. P. Henry, S. L. Randlett, W. A. Strain, F. M. Hammond, W. L. White and others to supply water and electric lights and manufacture ice. Capital stock, $15,000.

LOS ANGELES, CAL.—The Moravia Electric Power Company, incorporated by U. N. Monroe, C. T. Dorland, J. H. Partle, Moravia; H. V. Carter and J. F. Sartori, of Los Angeles. Capital stock, $100,000.

ALVIN, TEX.—The Business Men's Association is endeavoring to secure an electric light plant and waterworks.

ATHENS, OHIO.—The Athens State Hospital is inviting sealed proposals until June 20 for a complete electric lighting plant for that institution.

DODGEVILLE, WIS.—The City Council will advertise for bids for lighting the city by electricity, and a committee has been appointed to prepare specifications.

LA HARP, ILL.—An ordinance is before the council to authorize the establishment of an electric light plant.

MOULTON, IA.—Arrangements are being made for an electric light plant here.

ARMOUR, IA.—An electric light plant will be established here.

LA FAYETTE, GA.—A fine electric plant for incandescent lights is about to be established here at a cost of $3,000.

CHESTER, PA.—A five-year contract has been awarded the Beacon Electric Light Company for lighting the city.

BROCKTON, MASS.—The Edison Electric Illuminating Company has been granted the right to extend its wires to surrounding towns.

NORTHBRIDGE, MASS.—The Northbridge & Uxbridge Electric Company are considering the advisability of establishing a power line for use in stores and houses.

NORWALK, OHIO.—The Northern Electric Company is the name of a new company incorporated at Columbus with a capital of $25,000. The incorporators are: Parks Foster, of Elyria; George P. Jones, of Findlay; and B. P. Foster, Mayme C. Foster and J. W. Foster, of Norwalk.

CATASAUQUA, PA.—William Morrison, the electrician of this place, is placing an electric light plant for estate of Samuel Laubach, at Northampton. The plant will be run by water power.

YORK HARBOR, N. H.—An electric light plant is being put in here, and it is proposed to light the harbor and beach this Summer.

BARTON, VT.—This village has voted to have electric lights.

LAKE CITY, MINN.—The contract for a 650-light incandescent dynamo and a 60-light arc dynamo, together with the necessary wire, poles, etc., has been let to Burtis & Howard, of Minneapolis. The contract for a 100 horse-power engine was let to Geo. M. Kenyon, of St. Paul. The electric plant must be complete within 60 days. The contract price for the entire plant is $8,374.

GRAND LODGE, MICH.—The contract for furnishing this place with an electric light system has been awarded the Westinghouse Electric and Manufacturing Company.

LEWISTOWN, ILL.—This place is now lighted with a new system of arc electric lights.

ORLEANS, IND.—There is some talk of putting in an electric light plant at this place.

DEFIANCE, OHIO.—The electric light and power house was damaged by fire on May 24 to the extent of $6,000. The loss is fully covered.

CLEBURNE, TEX.—The new electric light plant is now in operation and is proving highly satisfactory.

BATON ROUGE, LA.—The Home Electric Company, successor to the Baton Rouge Electric Light and Power Company, has been organized by Samuel G. Laycock as president, and C. J. Barrow, vice-president, with a capital stock of $100,000.

EAST LIVERPOOL, OHIO.—E. H. Wells & Company, of Wellsville, will put in an electric light plant in the basement of their big building. The electric plant will also be used to run electric fans in all the stores which it supplies.

OCONTO, WIS.—The Oconto Electric Light and Fuel Company will enlarge its business. It intends to transform the lower story of its glass factory into a manufactory of telephone instruments.

NAZARETH, PA.—A line seven miles long will be built from here to Easton to supply the current from the Edison Illuminating Company's plant at Easton for 500 incandescent lights.

New Electric Railways.

CLINTON, N. Y.—Ellery Stebbins, Francis Tasker and others are interested in the proposed electric road which is to be built from Clinton to New Hartford, connecting with the Utica Belt Line road.

BENNINGTON, VT.—Work on Bennington & Woodford Electric Railroad will be commenced immediately.

PERTH AMBOY, N. J.—Edward Radell, secretary of the new trolley road to encircle Middlesex County, is at work upon plans for the road.

EAST BRIDGEWATER, MASS.—The Brockton and East Bridgewater companies have been granted a franchise for the construction of an electric railway through the town.

DUBLIN, PA.—A trolley line is to be built from Dublin to Souderton, a distance of eight miles, at a cost of $128,000.

NEWARK, N. J.—The Passaic & Newark Electric Railroad has broken ground and work will shortly commence on the construction of its road at Franklin.

ORLANDO, FLA.—E. W. Henck with a corps of engineers has commenced work for the construction of his electric railway that is to parallel the South Florida Railroad to Orlando. Survey started from Clyde Steamship wharf at Sanford.

DANVILLE, VA.—The Electric Street Railway Company will erect a power plant and car sheds.

AUSTIN, TEX.—The Texas Electric Company has been incorporated by C. W. Hobson and others with a capital stock of $5,000.

MACON, GA.—The Consolidated Street Railroad Company will extend and enlarge its electric light and power system.

PITTSBURGH, PA.—The controlling interest in the Pittsburgh, Neville Island & Coraopolis Railway has been sold by the directors to J. D. Callery, Thomas M. Bigelow, J. C. Reilly, W. J. Burns, A. L. Schultz and Thomas R. Pittock, representing the Pittsburgh and West End Traction Company and the Second Avenue Traction Company, for $100,000. The road is 14 miles long, operating from Chartiers to Coraopolis, over Neville Island. It was incorporated in 1892.

MILWAUKEE, WIS.—There is a project to build an electric railway connecting this place with Waukesha.

TIFFIN, OHIO.—Another corporation has been chartered to build an electric railroad between this place and Fostoria.

CHARLESTON, S. C.—Both lines of the street car railways of this city have been sold to a Brooklyn syndicate, represented by John B. Hoefgen, Edgar Maxam and A. H. Walker.

SYRACUSE, N. Y.—The Syracuse & Oneida Lake Electric Railway Company has been incorporated at Albany to operate an electric street road 12 miles in length, the termini to be in the towns of Cicero and Salina, Onondaga County. The capital is $300,000, and the directors are Hiram McGonegal, of New York, W. S. Wales, W. B. Kirk, J. B. Morgan, William O'Connor, Thomas W. Meacham, Edwin Lodder, James N. McCormick and William E. Wheaton, of Syracuse.

PORT HURON, MICH.—Mayor Boynton and other Port Huron capitalists propose to build an electric railroad from Port Huron to Algonac along the river, thence to Chesterfield, so as to connect with the Grand Trunk.

SPRINGFIELD, ILL.—The Canales Trolley Company has been incorporated by F. William Canales, Portland, Me.; A. M. Ross, L. Henry Pearse, Boston, Mass. Capital stock, $100,000.

SKOWHEGAN, ME.—The managers of the Skowhegan & Norridgewock Electric Railway and Power Company have voted to expend $5,000 in improvements on their road.

Business Troubles.

BALTIMORE, MD.—The plant of the Baxter Electric Motor Company has been sold at auction to bondholders for $25,000.

ATLANTA, GA.—The property of the Atlanta

Traction Company has been sold under orders of the United States Circuit Court to a Baltimore syndicate consisting of W. Checkley Shaw, Richard D. Fisher and Mr. Hinkley. The price was $150,000.

NEW YORK CITY.—The schedules of Charles E. Chapin, dealer in electrical supplies at 136 Liberty street, show liabilities of $22,636, nominal assets of $16,030 and actual assets of $13,311.

RAHWAY, N. J.—The Johnson Electric Signal Works, of Rahway, N. J., have been sold by the receiver, Edward S. Savage, to Oakley Thorn, who represented the National Signal and Switch Company, of Easton, Pa., for $40,000. The works are estimated to be worth more than $200,000, and the liabilities aggregate $107,000. The sale is subject to the approval of the Chancellor, and it is not believed that he will sanction it. If the Easton company get possession of the plant it is understood that it will be allowed to remain in Rahway, where the new owners will operate it as an Eastern branch of the works.

Government Bids Opened.

WASHINGTON, D. C.—Bids were opened at the Treasury Department on May 27, through the Superintendent's office, for electric wiring the new public buildings at Philadelphia, Pa.; Erie, Pa., and Monroe, La. The bidders were as follows: Philadelphia, Pa., Custom House—Walker & Kepler, Philadelphia, Pa., $1,717.55; Harry Smith & Co., Ltd., Philadelphia, Pa., $1,445; Gill & Co., Philadelphia, Pa., $2,313; McCay Howard Engineering Co., Baltimore, Md., $1,996; Morrison Southern Electric Co., Baltimore, Md., $1,795; Marcus Ruthenburg, Philadelphia, Pa., $1,760. Erie, Pa., Custom House—Morrison Southern Electric Co., Baltimore, Md., $2,285; Wesley Auten, Sunbury, Pa., $2,400; Electric Light, Heat and Power Co., Erie, Pa., $791.83.

Increase of Capital.

JEFFERSON CITY, MO.—The Metropolitan Street Railway Company has filed a statement of increase of capital stock from $3,600,000 to $8,500,000.

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EXPERIMENTAL WORK.

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Arc Light Repairing.

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CREOSOTING CO.

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Sight Feed Oil Cups.

AUTOMATIC "WIPING DEVICE"
For oiling Crank and Cross-head Pins.
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PL DIXON'S PERFECT LUBRICATING GRAPHITE.
The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease.
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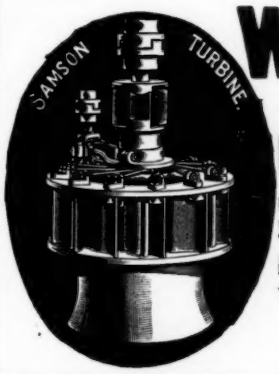

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Galesburg, Ill., Feb. 23, 1895.

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Among the recent orders taken by the Walker Manufacturing Company, of Cleveland, O., for their improved street railway motors and generators may be mentioned the following: The Detroit Railway Company, Detroit Mich., one 760-kilowatt direct-connected generator, this being the second machine of this size which the Detroit railway have ordered from the Walker company. Aurora Street Railway Company, Aurora, Ill., nine complete car equipments, eighteen 25 horse-power steel motors. This order was awarded this company after a thorough test had been made of three or four of the leading makes of motors, and is the second order awarded the Walker company by the Aurora company. Akron Street Railroad Company, Akron, Ohio, two 200-kilowatt direct-coupled generators; three complete car equipments, six 30 horse-power steel motors. This is the third order which they have received from the Akron Street Railroad Company. New York, Elmsford and White Plains Railroad Company, White Plains, N. Y., one 75-kilowatt belted generator; three complete car equipments, six 25 horse-power steel motors. Lakeside Railway Company, Mahoney City, Pa., two complete car equipments, four 50 horse-power steel motors. W. C. Thayer, Cleveland, Ohio, two 200-kilowatt direct-coupled generators; ten complete car equipments, twenty 50 horse-power steel motors; one complete car equipment, two 100 horse-power steel motors. Ashland & Catlettsburg Street Railway Company, Ashland, Ky., two complete car equipments, two 30 horse-power steel motors. Their shops are still running both day and night and their force is being increased almost every day.

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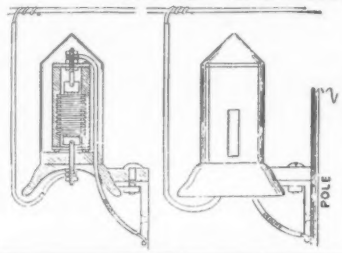

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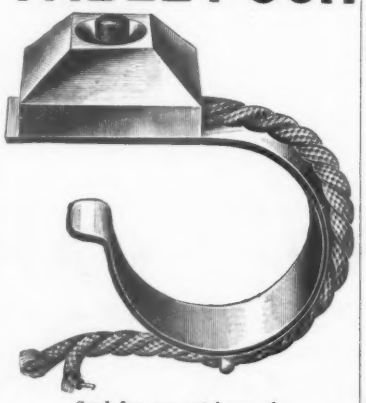

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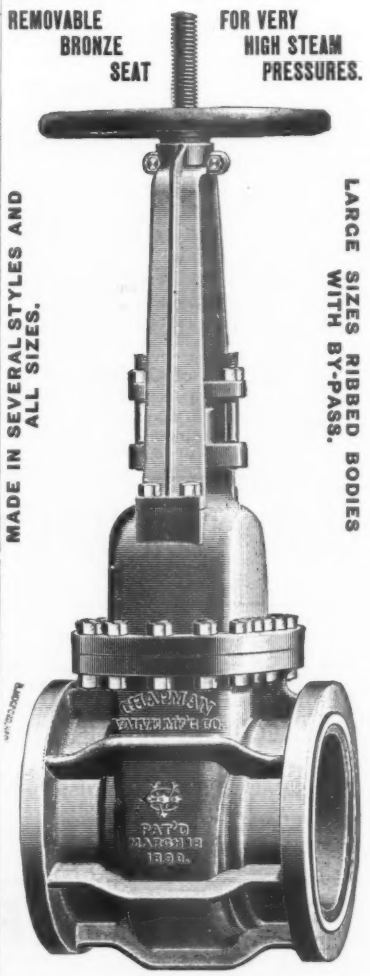

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